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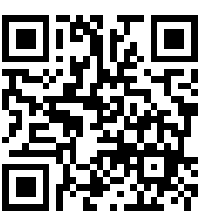

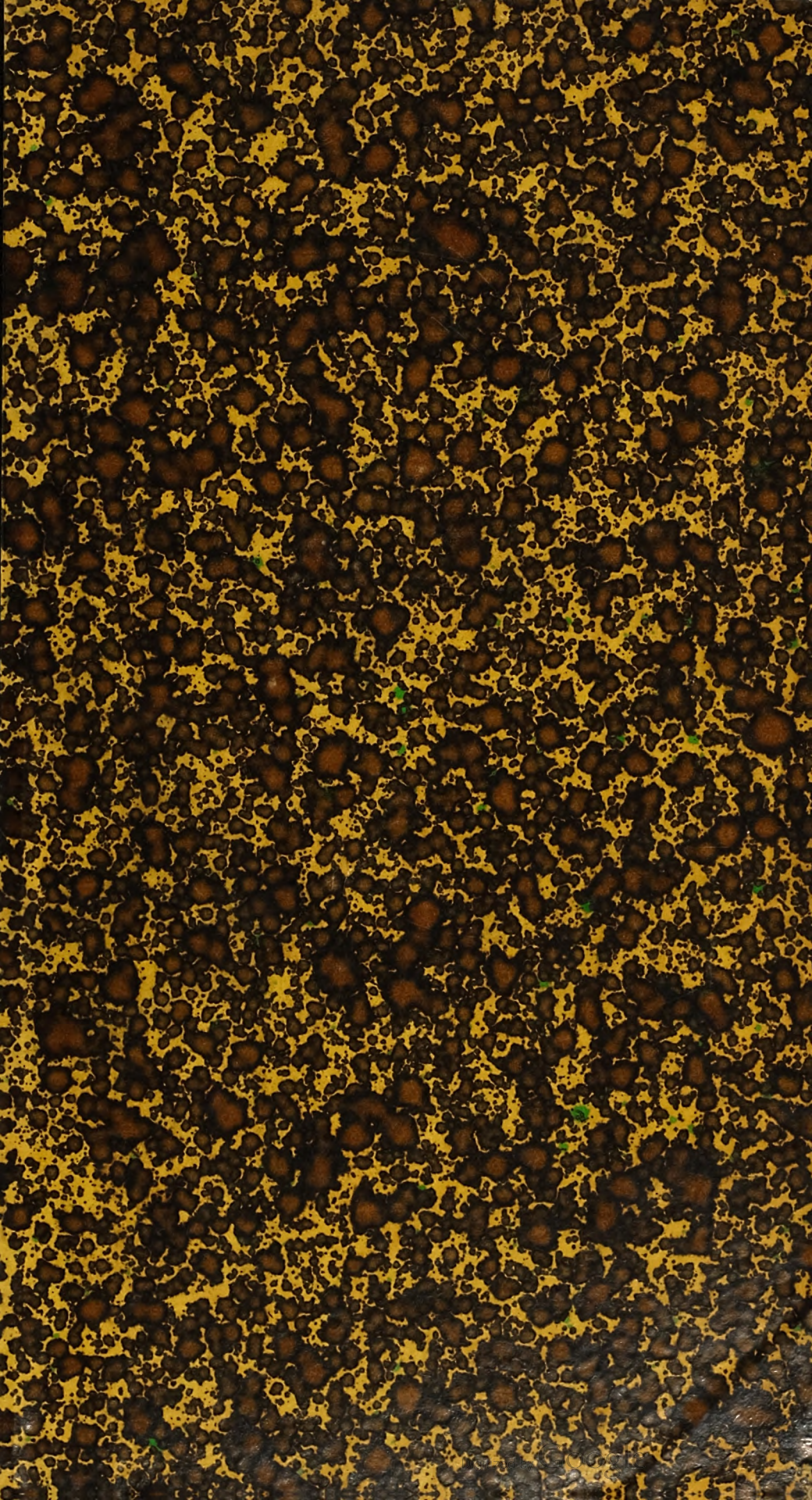

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THE RAILWAY MAGAZINE.]

L.N.E.R. UP EAST COAST EXPRESS LEAVING ABERDEEN.

N.B. SECTION 4-4-2 Type Locomotive No. 9902, "Highland Chief."

(From a Photograph by H. Gordon Tidey.)

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GENERAL VIEW OF STATION.

Stirling as a Tourist and Traffic Centre.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

THERE are few places, even in Scotland—the land of history and romance—which have so much to offer as does the "Ancient and Royal" Burgh of Stirling, once the home of Scottish kings, and its old Parliament House the centre of legislation. As the Official Guide issued by the Stirling Town Council effectively summarises one phase :—

Here have been enacted some of the most thrilling episodes in the drama of these islands; here have walked and talked and fought many of the most romantic figures in the history of the British people. Stirling for centuries was the home of Scottish Kings; in troublous times legislation was centred in its old Parliament House; within its ancient church, Knox, that impassioned iconoclast, lashed with fiery denunciation the shortcomings of the Roman church, and the same old fane was once mute witness to the baptism of a babe whose head was destined to bear the Crown of England.

And again :—

Round the rock on which the Castle's battlements still keep silent watch and ward, English pikes have often glittered in past days, and up its steep sides the flower of English chivalry has more than once stormed in victorious assault. Beneath its ramparts, in dead of night, intrepid clansmen have gathered mysteriously with hushed voices, bent on desperate enterprise, and suddenly swarming over the grey old walls with fearsome slogan and fierce blows, have put its southern defenders to the sword. From these same old walls we may stand and view Stirling Bridge, where Wallace hurled back the attack of Surrey and Cressingham, and see, too, the field of Bannockburn, where the Bruce smashed into utter defeat the huge forces of the proud Edward.

Moreover, "Stirling's appeal is not ended when its castle and church and Parliament House have been seen; the whole district teems with beauty and tales of derring-do," while as a tourist centre there are few places so conveniently located, so pleasantly situated, and so suitable for radiating tours of widely varying interest. Further, while these aspects will, no doubt, appeal to readers of THE RAILWAY MAGAZINE, who in such matters are on the same footing as the general body of tourists and holiday makers, Stirling station is the centre of a great deal of distinctly interesting traffic working, and while paying due tribute to the historic and scenic attractions of Stirling and district, we can quite imagine that many will desire, if they have not done so already, to spend some time at the

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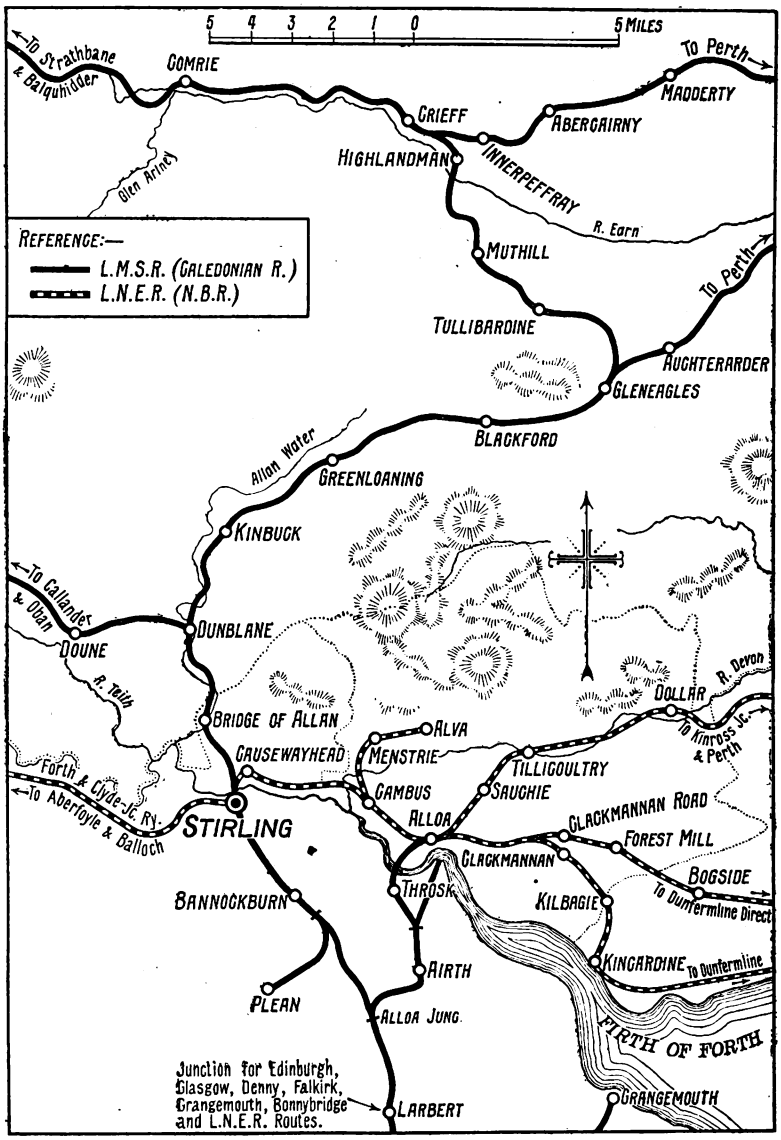
station during a busy period and to "taste" some of the good things which the railways concerned have to offer in the way of touring and excursion facilities. There is much to be said, indeed, for arranging a touring itinerary, such as those provided by the many and varied tourist tickets, round tours, &c., available for passengers from England and from Scottish centres from May to October. Many of these include Stirling as a "break of journey" station, place it on an alternative route, or bring the traveller sufficiently near to justify a local trip, either by ordinary or excursion train, to this famous old city.



MAP OF RAILWAY ROUTES TO AND FROM STIRLING.

The fact that Stirling is on the main L.M.S. route from Glasgow, Edinburgh and the south to Perth, Aberdeen and the Highland line, while it frequently constitutes the junction station (the actual junction is Dunblane) for the Callander

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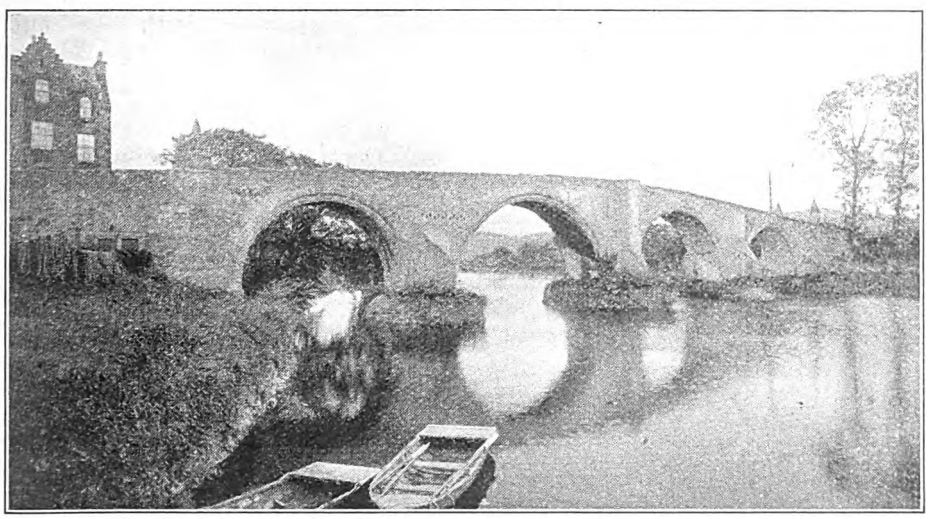
and Oban line, gives it the benefit of main-line train services and of through carriage facilities on a generous basis. Further, these facilities are realised to the full, in that there are very few expresses which do not call at Stirling, and most of these are included in one or other of the interesting groups of trains which characterise the services on this section, so that if one train does not call at Stirling there is another associated with it which does. Moreover, while the station is the property of, and is staffed by, the London, Midland and Scottish Railway, it accommodates a by no means unimportant proportion of



THE OLD BRIDGE AT STIRLING.

London and North Eastern trains on routes which possess considerable interest, and the traffic connections are well worthy of study.

All L.M.S. trains enter Stirling Station at the south end, from the Larbert direction, whether from Carlisle and England, from Glasgow (Buchanan Street or Central) or from Edinburgh (Princes Street). The latter trains exercise running powers over the L.N.E.R., from the Haymarket Junctions (Edinburgh), through Falkirk (Grahamston), until L.M.S. metals are reached south of Larbert. The principal L.N.E. trains from Edinburgh, which travel via the Forth Bridge, Dunfermline and Alloa, enter Stirling Station at the north end, though L.N.E.R. trains from Glasgow (Queen Street), from Edinburgh (Waverley) via Falkirk (Grahamston), and locals from Grangemouth and Falkirk use the L.M.S. route via Larbert.

North of Stirling L.M.S. trains continue to Perth, Aberdeen, Dundee, Inverness and the Highland line, the Callander and Oban line via Dunblane, or to Crieff, Comrie, St. Fillans and Balquhidder via Gleneagles. L.N.E.R. trains diverge to Alloa on one side, and thence to Kinross Junction, Perth, Ladybank, etc., or to Dunfermline (direct or via Kincardine), Edinburgh, etc., or on the other side to the Forth and Clyde line, to Aberfoyle, Balloch, etc.

It will therefore be seen that Edinburgh services are given generally from the north in the case of the L.N.E.R., though L.N.E.R. Glasgow trains use L.M.S. lines between Larbert and Stirling, while L.M.S. main line services all use the Larbert-Stirling section, whether they come from Edinburgh or Glasgow or from Carlisle and England. Stirling station is therefore important not only on its own account but also as a centre for interconnecting trains.

Stirling first obtained railway facilities in 1848, when the old Scottish Central line was opened from the Caledonian at Gartsherrie via Greenhill to Larbert,

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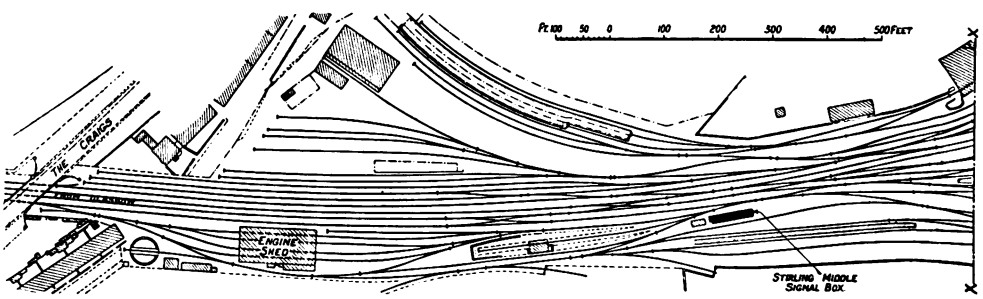
Stirling and Perth, there connecting with the Scottish North Eastern, which completed the route to Aberdeen. The Scottish Central Railway, by the way, was also built to connect with the Edinburgh and Glasgow Railway (later N.B.R.) at Falkirk, as well as with the Caledonian, a fact which explains why L.M.S. trains utilise part of the L.N.E.R. to provide the L.M.S. Edinburgh–Larbert and Stirling connections.

The Forth and Clyde Junction Railway was incorporated in 1853 and opened in May, 1856. Working arrangements gave place to a 50 years' lease to the North British Company in 1875, but this company is now included in the L.N.E.R. system under the Railways Act of 1921, so that the question of renewal of lease has not arisen. The Forth and Clyde was, however, operated as a separate concern, though by North British engines, vehicles and staff, maintaining its own



PLAN OF PASSENGER STATION.

accounting and issuing its own annual reports. The Stirling–Alloa line was constructed by the Stirling and Dunfermline Railway Company in 1850–52 and taken over by the North British Railway in 1862.

The modern station at Stirling is regarded as one of the outstanding works of its kind on the late Caledonian system. It was completed in 1915, replacing a structure and lay-out which had become seriously inadequate. It is characterised, first, by the station buildings, which are designed on unusually neat and appropriate lines; secondly, by the lay-out and constructional features of the booking-hall, with the adjacent refreshment, dining and waiting rooms, and the parcels and staff offices; thirdly, by the covered and open footbridges which give connection with other platforms; and, fourthly, by the neat and effective design of platforms, shelters and premises generally. It is, in fact, one of several Caledonian stations which are notable in respect of the attention to æsthetic aspects in carrying out constructional work, and the adaptability of floral decorations in conjunction therewith.

The station is reached from King Street, one of the main thoroughfares in Stirling, via Murray Place and the Arcade, with a footpath approach from Shore Road Bridge which crosses the railway at the north end of the station. The grey-stone castellated design of the frontage, with its three gables, harmonises with the building characteristics of the town. There is a spacious yard for cabs, &c., broken intermediately by a garden. Entering under a verandah shelter, above which is a large clock, a wide passage-way leads into a circulating area of semicircular lay-out, of which the inner circumference is filled by the booking office. The outer circumference is lined by staff and other offices. To the right, in order: left luggage department, passageway to luggage entrance from station yard (ticket-collectors' and staff offices on one side), tobacco stall, hairdressing saloons (for ladies as well as gentlemen), and stationmaster's office. To the left: excess luggage, train office, passage-way to parcels yard, telephone office, dining room, and at the end a confectionery stall. The circulating area itself has a glazed roof, with artistic ironwork following the curve, and is designed for hanging flower-baskets, as elsewhere about the station. The cabinet work

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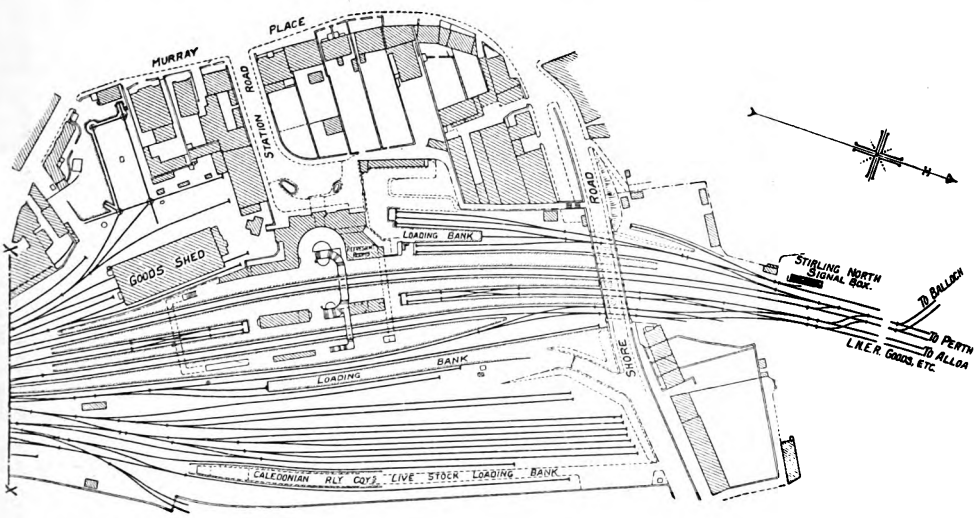
harmonises with the general artistic scheme.

To the left are the premises of the parcels department, with a covered yard, a bank at platform level against which vans can be backed, and direct access to the main down platform without interfering with passenger movements, a subway and hoists giving free communication with other platforms. To the left of the station yard are other station premises, with garden plots here and there, and the pathway to Shore Road Bridge already mentioned. To the right is a luggage passage-way direct to the main down platform, available as an alternative exit when traffic is heavy, and the offices of the goods department.



GOODS YARDS, ETC.

Access to the platform is through gates adjacent to the stationmaster's office, and immediately to the left is a curved staircase leading to the footbridge. This is roofed in harmony with the steel and glazing of the circulating area and decorated with hanging flower-baskets and shrubs in pots or containers, the arrangement being duplicated where the staircase descends to the main up platform. Behind the staircase, on the down platform, is a large bookstall, while beyond are, in one direction, confectionery stall, refreshment and dining rooms, and in the other, various waiting rooms and staff offices. At the north end is a bay platform, often used by local trains for the Callander and Oban line.

A considerable length of the platform is roofed over, and in this respect the main up platform forms an effective balance, this applying also to the lay-out of the footbridge staircase, tobacco and confectionery stalls, refreshment rooms, waiting rooms, &c., though the order is somewhat different. But, although the two main platforms are thus well sheltered and equipped, the rest of the station is rather less well served, in that the outer face of the main up platform, serving the alternative down line, is practically open throughout. Further, the outermost platform of all, an island serving the alternative up line and an outer line, is unsheltered, except for a block of buildings accommodating waiting rooms, lavatories, &c. Moreover, while the footbridge between the two main platforms is covered, the extension to the further island platform is open. The bay platforms, two at each end of the central platform, are entirely open.

It must be remembered, however, that all the main-line traffic is dealt with at the two chief platforms, so that it is only for interchange traffic with branch and connecting trains that the absence of shelter on parts of the station can be noted at all. In every other respect, however, the station ranks as one of the

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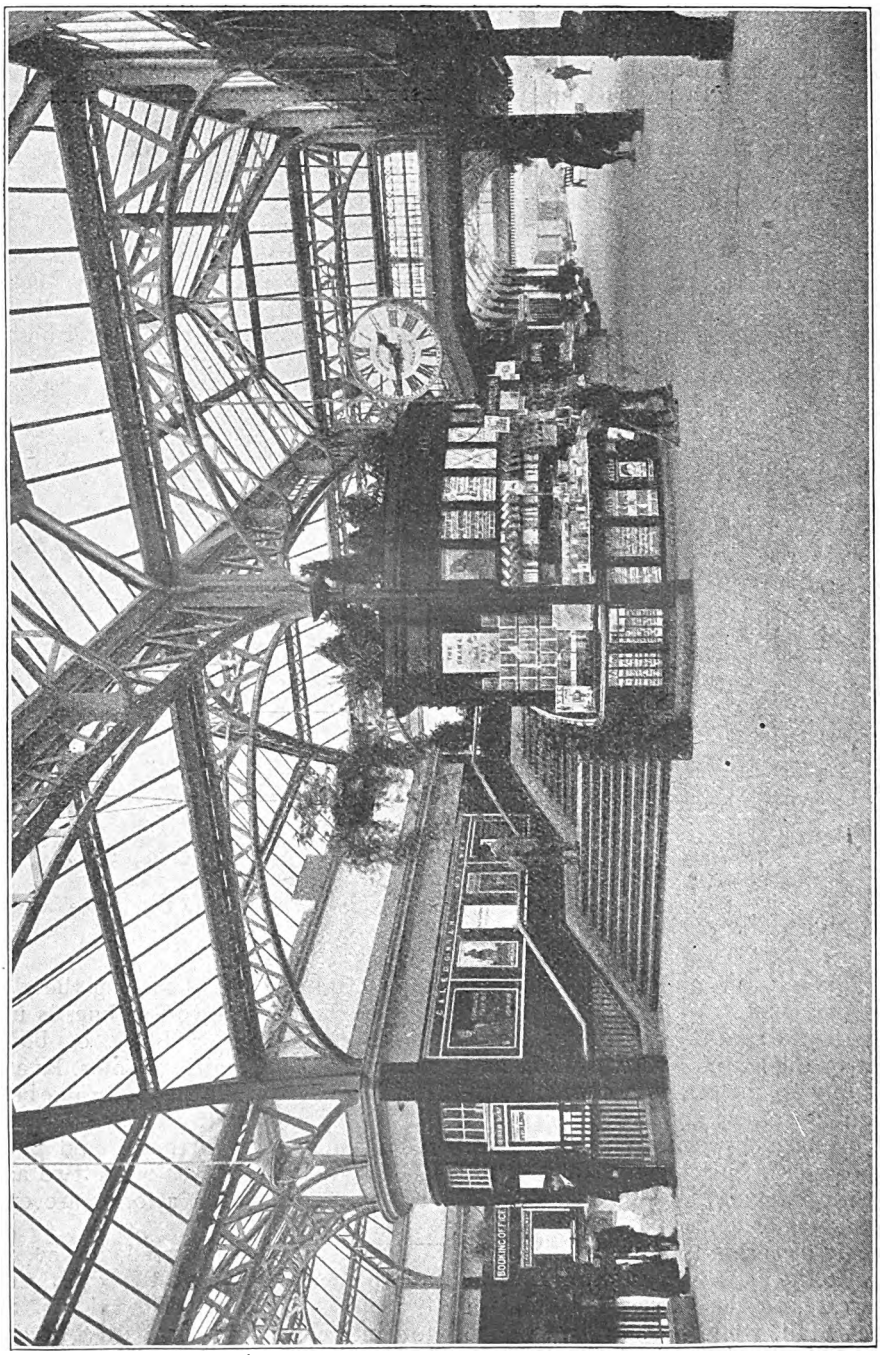

DOWN MAIN PLATFORM AND CIRCULATING AREA.

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best equipped and most artistically designed of its type.

The usual allocation of platforms is as follows: No. 1, behind main down platform, Callander and Oban or other northbound L.M.S. local trains; No. 2, down main; No. 3, up main; Nos. 4 and 5 (north bays), Forth and Clyde or L.N.E.R. local trains; No. 6, down relief; Nos. 7 and 8 (south bays), L.M.S. locals, also connecting trains, including those made up by the remarshalling of up main-line trains, to Edinburgh, &c.; No. 9, up relief; No. 10, outside spare line, signalled by up and down movements and available to meet the needs of periods of pressure. Usually L.N.E.R. through trains use Nos. 6 and 9 platforms, though they can be passed over the main lines, while L.M.S. trains can equally use Nos. 6 and 9. Either company's trains can be handled on No. 10, as need may arise. Goods trains are usually passed through on Nos. 6 and 9, or, if they are to be held, placed on No. 10.

Beyond No. 10, south of Shore Road Bridge, is an up marshalling yard and beyond are tracks serving Government Ordnance premises. On the down side, partly behind No. 2 platform, is the L.M.S. goods shed and offices, and for some distance down the line the running tracks are paralleled by extensive carriage and goods sidings. North of Shore Road bridge, there are, on the left, shunting tracks, municipal cattle pens and local goods and coal accommodation, while on the up side is the L.N.E.R. goods yard and offices, carriage sidings, engine shed, &c.

Of the many tracks on one or both sides of the running lines, eight pass under Shore Road Bridge (including the platform serving Nos. 1 and 2). These settle down into four running lines, Forth and Clyde L.N.E.R. trains transferring to the L.M.S. main tracks for a short distance, though almost immediately they diverge on the left, while L.N.E.R. trains run on their own lines to cross the Forth by a bridge alongside that used by L.M.S. trains. The Forth and Clyde line had its own engine shed and goods yard a little way along the branch, though under present conditions the accommodation here is utilised as convenient, in conjunction with the L.N.E.R. shed near the river bridge.

At this stage it is necessary to revert to the subject of Stirling's places of interest, in that several features associated with the railway lay-out call for reference, particularly the windings of the River Forth. Beyond the Government Ordnance factory and the up marshalling yard already mentioned is one loop of this winding river, here of moderate width, so that one has some difficulty in recognising it as the same stream as that crossed, many miles farther down, by the great Forth Bridge, or even, at a point much nearer, by the L.M.S. viaduct and opening bridge at Alloa. This loop is, therefore, quite close to the town and station, and conveniently reached from Shore Road Bridge. This route is taken in visiting several places of local interest, the river being crossed by ferry. But before reaching the famous Stirling bridges, a bare half mile from the station direct, the river goes a mile or so round, farther indeed than Causewayhead, the first station towards Alloa, then looping back to skirt the base of the mass of rock on which stands Stirling Castle, overlooking the town, and at this point it is crossed by no fewer than four independent bridges close together.

One is the successor to the old original bridge built in 1410, and presumably almost on the site of that concerned in the famous battle of 1297. The present bridge is of the old-fashioned type, with four arches. About 100 yards away is the "New" bridge, which now carries most of the road traffic, though as it was built by Robert Stephenson in 1831 its name can be used in a comparative sense only. Another 100 yards along are the two railway bridges, separate but close together. These are generally similar in design, though differing in detail, and have two intermediate piers each, with an arch span over the public roads on each side. They are of girder type, with the girder structures below rail level. One is the property of the L.M.S. Company and the other of the L.N.E.R.

The Forth and Clyde line does not need to cross the former river, though, in view of further meanderings of that wandering stream, it does not join company again for several miles. As it curves away from the L.M.S. line on the down side it comes quite close to the New bridge, and as it

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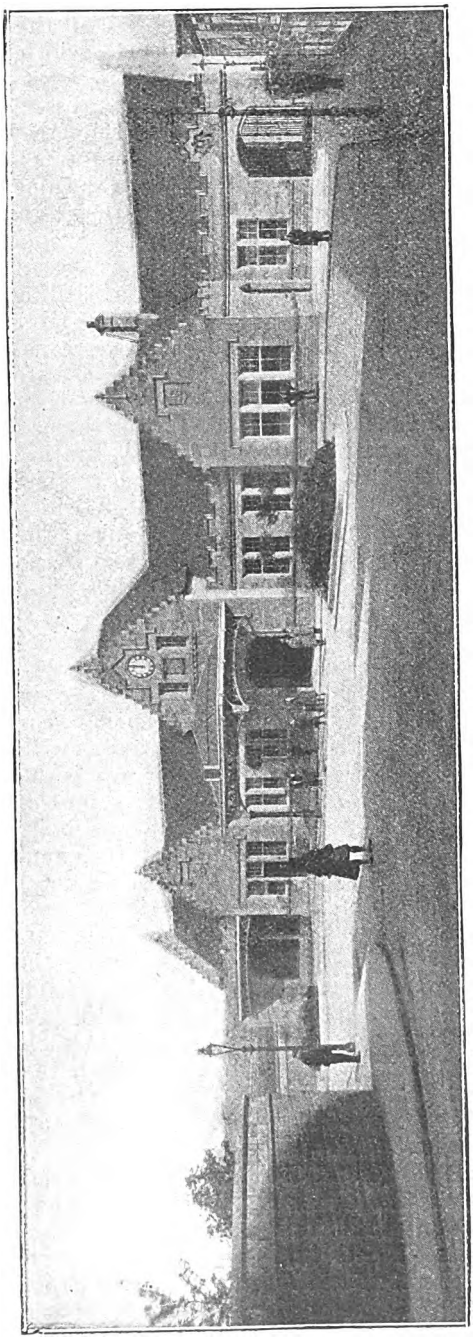
becomes single-track a somewhat peculiar level crossing lay-out is involved. Two roads converge upon the New bridge, so that no fewer than four separate gates are necessary as the railway crosses them in order, with a stretch of green between. Adjacent is a clock tower erected many years ago as a memorial to a local worthy.



GENERAL VIEW OF STATION BUILDINGS.

Some 385,000 tickets are issued annually at Stirling station, and about 600,000 collected. Over £100,000 are taken annually in regard to passenger traffic. About 110,000 platform tickets are issued in twelve months.

Station premises are steam-heated from a central plant, and electrically lighted, as also the yards, throughout. There are three signal-boxes, South (21 levers), Middle (86 levers), and North (102 levers).

The L.M.S. staff attached to the station and under Mr. McWhirter, stationmaster, includes 9 clerks, 5 telegraph clerks, 2 inspectors, 4 foremen, 6 ticket collectors, 7 shunters, 32 porters, and 15 signalmen and booking lads, together with 4 passenger guards attached to the station. There is no L.N.E.R. passenger station staff, though that company has, of course, its own goods and shunting and engine shed staff. L.M.S. goods and mineral yard working is under the direction of Inspector Donnachie, with 1 clerk, 6 yard foremen, 18 shunters and 35 goods guards, while Mr. Chalmers, as Goods Agent, has 10 clerks and 15 shed men. Mr. Gibson is loco. foreman, with 2 assistant foremen, 5 clerks, and 252 running and shed men. Usually 22 passenger, 25 goods and 6 shunting engines are operated from Stirling L.M.S. shed.

Traffic at the station can be thus broadly classified :—

L.M.S.R.

5 up and 5 down London expresses.
Up and down mail trains.
6 up and 6 down Glasgow–Aberdeen expresses.
4 up and 4 down through Oban line trains.
7 up and 7 down, Edinburgh (Princes Street) trains.
Also, through services to and from Dundee, and local trains to Perth, Crieff, Gleneagles, Callander, Dunblane, Larbert, Grangemouth and Glasgow, and three through fish trains, parcels trains and through and local goods trains, &c. Colliers' trains to and from Manor Powis and Polmaise collieries may also be mentioned.

L.N.E.R.

5 Forth and Clyde trains each way.
8 Edinburgh via Alloa, Dunfermline and Forth Bridge.
Also several trains between Glasgow (Queen

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Street) and Perth via Stirling and Alloa, locals to Alloa, and giving connections for Dunfermline, Thornton Junction, Fife watering places, &c., and to Buchlyvie (for Aberfoyle).

Mention has already been made of the fact that many of Stirling's most interesting trains are associated in groups, for which reason, also because this course will bring out many features of interest, it will be best to review the day's services in order. The summer arrangements are considered, attention being given first to the L.M.S. services.

From the south there are no important L.M.S. main-line services, though a number of goods and other trains work through, after the 12.15 a.m. for Dunblane has left, until, at about 4 a.m., the relief Highland and Aberdeen sleeping car express passes through, that is, unless one train only is run, which occurs rather infrequently, except, perhaps, right at the beginning or near the end of the season. Usually, there is one train for the Highland line and another for Aberdeen, the latter bringing the Oban sleeping car and through vehicles, unless that traffic, too, demands a complete train to itself. The Oban vehicles are usually transferred to one of the sidings beyond No. 1 platform, as there is no need to send them forward until 5.50 a.m., in view of the intermediate station traffic which they also carry. At 4.44 a.m. Stirling has its first public time-table train, by the 7.40 p.m. from Euston, the main Aberdeen and Inverness sleeping car train. This brings the Oban section on Sunday nights, and during the quieter months of the year is the standard sleeping car service from London for all parts of Scotland north of Edinburgh and Glasgow.

At 5.17 a.m. a train arrives from Glasgow (Central), whereas the usual Glasgow terminus is Buchanan Street. This is the Glasgow connection with the postal train, which, after the Glasgow vehicles have been combined with it (5.17–5.29 a.m.) becomes a " Limited Mail " train, in that its passenger accommodation is restricted to that of the standard four vehicles (in addition to mail vans), and the time-table explains that local passengers are " only conveyed from Stirling, if room." This train is, in fact, timed very fast beyond Stirling, a further reason for limiting its make-up.

Following this, thus timed to enable them to take on transhipped mails, are the 5.35 a.m. Gleneagles and Crieff, and the 5.50 a.m., already mentioned, to Callander and Oban. At 7.9 a.m. a stopping train leaves for Perth and Dundee, and after the arrival at 7.55 a.m. of a train from Edinburgh at 8.3–8.6, the 7.15 a.m. Pullman Restaurant Car Express from Glasgow is dealt with. This is followed, at 8.13–8.16 a.m., by the Aberdeen section of the 11.5 p.m. from Euston. This includes sleeping cars for Dundee, while a Pullman Restaurant Car, attached at Carstairs, provides breakfast facilities for Aberdeen passengers, available also for Dundee passengers as far as Perth. This train does not pick up at Stirling (or at Gleneagles), as local passengers are sufficiently catered for by the preceding train. At Perth the two are combined. At 8.35–8.42 a through train from Carstairs comes along, its calls being largely governed by the requirements of long-distance passengers who have changed from the express, while local needs are partly supplied by the 8 a.m. from Glasgow to Oban, which calls at Stirling, 8.46–8.50.

At 9.13–9.18 a stopping train from Glasgow to Perth is dealt with, and is followed by the 9.15 a.m. Glasgow to Perth express, and the 9.25 a.m. from Edinburgh to Perth. These are dealt with at Stirling, 10.1–10.3 and 10.20–10.24, respectively, the latter detaching a through carriage from Edinburgh to Killin Junction (in conjunction with some of the special summer tours associated with the Callander and Oban line) which goes forward from Stirling at 11.5 a.m. The two expresses mentioned constitute feeders at Perth to the 10 and 10.10 a.m. expresses from Glasgow. The first of these, a Pullman Restaurant Car Express for the Aberdeen route, makes its first call at Gleneagles, while the second, mainly for the Highland line, with a Pullman Restaurant Car as far as Aviemore, detaches at Stirling, 10.54–10.57 a.m. the Glasgow vehicle for Killin Junction, which, with the Edinburgh coaches attached, goes forward at 11.5 a.m.

This completes the morning series, and for some time a few ordinary trains only are dealt with, 12.30–12.33 p.m. Edinburgh to Dunblane (on Saturdays to Greenloaning) ; 12.54–1.4 p.m. Glasgow to the Callander and Oban line ; 1.18–1.24 p.m.

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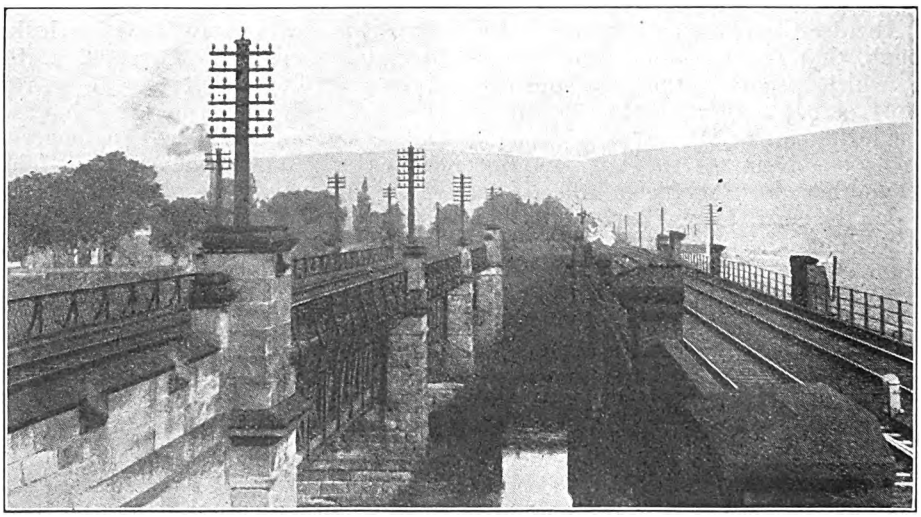
Glasgow to Perth stopping train; 1.51–1.54 p.m. Glasgow to Dunblane (Saturdays only). At 2.3–2.6 p.m. an Edinburgh–Perth Express inaugurates another series, as it is followed by the running through Stirling of the 1.30 p.m. Glasgow–Aberdeen Pullman Restaurant Car Express, first stop Gleneagles, and the calling of the 1.40 p.m. Dundee and Inverness Express from Glasgow at Stirling, 2.30–2.34 p.m. and the division therefrom of the 2.42 p.m. ex Stirling to Callander. At 2.47 p.m. a Glasgow train arrives on Saturdays; at 3.52 p.m. a local from Larbert comes in on the same day; and at 4.15 p.m. a local leaves for Dunblane and Greenloaning.



L.M.S. (LEFT) AND L.N.E. (RIGHT) RAILWAY BRIDGES OVER THE RIVER FORTH NORTH OF STIRLING.

Then at 4.30 p.m. a train from the south arrives, in connection with the 2.35 a.m. from Euston and Liverpool and Manchester Anglo-Scottish services, and including a restaurant car running between Crewe and Stirling. This finishes at Stirling, but acts as a feeder to the 4 p.m. from Buchanan Street for Gleneagles and Crieff. This train, at Stirling 4.52–4.54 p.m. also divides to form the 4.59 p.m. to Callander. At 5.21–5.24 p.m. an Edinburgh–Perth train precedes and collects for the 5.0 p.m. Pullman Restaurant Car Express from Glasgow to Aberdeen, at Stirling 5.44–5.47 p.m., and behind the latter is the 5.10 p.m. Glasgow–Oban train, at Stirling 5.57–6.0 p.m. A stopping train at 6.15 p.m. to Perth and the 6.32–6.39 p.m. from Glasgow to Dunblane fill the interval until the 6.5 p.m. Glasgow–Aberdeen Restaurant Car Express arrives at Stirling, 6.52–6.54 p.m. This is immediately followed by the 7.0 p.m. to Callander, and at 7.2 p.m. the Aberdeen portion of the 10.0 a.m. ex Euston comes in (to set down passengers only), in that the 6.54 and 7.0 p.m. meet local requirements. At 7.22–7.30 p.m. a stopping train from Larbert to Greenloaning (Gleneagles on Saturdays), and at 9.2–9.5 p.m. a Glasgow–Dunblane train complete the day's work, except for the 11.1 p.m. (combining at Stirling the 9.45 p.m. from Edinburgh and the 10.0 p.m. from Glasgow, with a through carriage from Glasgow to Wick and a sleeping car, Glasgow to Inverness, except Saturdays), the 11.50 p.m. (Perth portion of the 1.30 p.m. from Euston) and the 12.15 a.m. local train from Stirling to Dunblane, which runs on to Callander, if required, for through passengers from England. The only trains on Sundays in this direction are the 7.15 a.m. from Glasgow (Central) to Aberdeen, at Stirling 8.21–8.26 a.m., and the 11.5 p.m. ex Euston, which arrives at 8.51 a.m., leaves at 8.54 a.m., and is followed by the 9.10 a.m. to Oban.

To a great extent the up services include similar characteristics, though, as will be

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seen, differently applied, so that it will be most convenient to set them forth in a general statement with the assistance of brackets and a few notes.

From	Arr.	Dep.	To
	a.m.	a.m.	
Perth	7 12	7 18	Glasgow.
Inverness (*a*) ..	8 2	8 4	Glasgow.
Callander ..	8 28	8 31	Glasgow.
		8 35	Larbert and Denny.
Comrie	9 1	9 4	Glasgow ("Strathearn" Express).
		9 12	Edinburgh.
Dundee (*b*) ..	9 38	9 41	Glasgow (*b*).
Oban	9 44		
Aberdeen and Dundee	9 53	9 57	London and the South (*b*).
		10 4	Edinburgh.
		10 9	Glasgow.
Perth	11 20	11 26	Glasgow.
	p.m.	p.m.	
Oban	12 32	12 38	Glasgow.
Aberdeen ..	1 8	1 12	London and the South (*b*).
Aberdeen ..	1 22	1 25	Glasgow (*b*).
Dunblane (N.S.)	1 30		
Greenloaning (S.O.)	1 33	1 39	Larbert and Denny (S.O.).
Callander (S.O.)	2 3		
Dunblane (N.S.)	2 10		
Perth	3 9	3 16	Edinburgh.
Oban	3 34	3 41	Glasgow.
Inverness (*b*) ..	3 59	4 2	Glasgow.
		4 12	Larbert.

Aberdeen-Glasgow Restaurant Car Express passes through, calling at Bridge of Allan but not Stirling.

Aberdeen (*b*) ..	4 37	4 41	Carlisle and the South (*b*).
Callander ..	4 44	4 48	Edinburgh (S.O.).
Greenloaning ..	5 18	5 20	Larbert.
Aberdeen (*b*) ..	6 22	6 26	Glasgow (*b*).
Perth	7 2	7 8	Larbert.
Oban (*b*) ..	7 20	7 28	Edinburgh.
		7 34	Glasgow.
Perth	8 13		
Inverness (*b*) ..	8 23	8 30	Glasgow (*b*).
Aberdeen (*b*) ..	8 37	8 40	Glasgow (*b*).
Oban (*b*) ..	8 45	8 53	Glasgow (*b*).
Dunblane ..	9 37		
Inverness (*a*) ..	9 56	10 8	London and the South.
Aberdeen (*a*) ..	10 51	10 55	London and the South.
Aberdeen ..	11 5	11 11	Glasgow (Central).

SUNDAYS.

From	Arr.	Dep.	To
	p.m.	p.m.	
Aberdeen (*b*) ..	4 43	4 47	Carlisle and the South (*b*).
Aberdeen ..	5 2	5 10	Glasgow (Central).
Dundee ..	9 22	9 24	Glasgow (Central).

(Combined with the last is the sleeping car train from Dundee to London and the South, division being made at Coatbridge.)

(*a*) Sleeping car.
(*b*) Restaurant car.

The foregoing particulars, necessarily somewhat lengthy, will give not only a good impression as to the importance and volume of L.M.S. traffic at Stirling, but also an indication of the many features of interest attaching thereto.

On the L.N.E.R. side the arrangements are very much simpler, but the trains add very materially to the traffic facilities which centre on Stirling. For example, trains arrive at Stirling from Edinburgh via the Forth Bridge, Dunfermline and Alloa at 7.35, 9.42 and 10.26 a.m., and at 12.29, 2.52, 5.49, 7.19, 8.13, and 9.39 p.m. Several of these are semi-fast, and the 9.15 a.m. ex Waverley is of interest in that it brings through carriages for Aberfoyle and Balloch, going on from Stirling at 10.37 a.m., an important factor in the L.N.E.R. "Trossachs Tours." The return trains leave Stirling for Edinburgh at 7.53 (to Dunfermline), 8.15, 10.5 a.m., and at 12.10, 1.40, 4.0, 5.48, and 8.27 p.m. This last conveys the return coaches from Balloch and Aberfoyle.

Another L.N.E.R. service, this time not terminating at Stirling, is that from Glasgow to Perth via Stirling and Kinross Junction. These trains leave Queen Street (Glasgow) at 9.0 a.m., 1.32, 4.47 and 7.38 p.m., with a train as far as Alloa (via Stirling) at 10.5 p.m. There are also trains starting from Stirling at 5.12 p.m. to Alloa, at 7.0 p.m. to Perth, and at 9.15 p.m. to Alloa, and on Saturdays to Dollar. The return trains arrive at Stirling at 8.19 a.m. (from Kinross Junction), 10.32 a.m. from Dollar, 4.37 and 6.26 p.m. from Alloa, and at 9.32 p.m. from Perth to Glasgow. A few trains on this service travel via the L.M.S.R. direct between Larbert and Alloa via Alloa Bridge, thus

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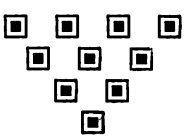
MR. W. E. McWHIRTER,
Stationmaster,
Stirling.

avoiding Stirling. There are, however, some additional trains between Stirling and Alloa, so that quite a plentiful service is provided on this section.

On the Forth and Clyde line trains leave Stirling for Balloch at 6.40 a.m., 7.25 a.m. (to Buchlyvie only), 10.37 a.m. (with the through coaches from Edinburgh to Balloch and Aberfoyle already mentioned), 2.57 p.m., 4.10 p.m. (not Saturdays, to Balfron), and 6.6 p.m. The return trains arrive at Stirling at 8.10 a.m., 8.49 a.m. (from Buchlyvie), 9.58 a.m., 11.59 a.m. (from Buchlyvie), 5.6 p.m., 5.59 p.m. (not Saturdays, from Balfron), 8.4 p.m. (with through coaches from Balloch and Aberfoyle to Edinburgh).

Many of the trains mentioned, both L.M.S. and L.N.E., are included in special tours, among which we may refer to the various forms of the famous "Trossachs Tours" and services in conjunction with the MacBrayne steamers via Oban, the Caledonian Canal, etc. A wide variety of excursion and tourist arrangements is also in force, so that, at Stirling, the visitor has an exceptionally varied assortment of facilities from which to choose, far too comprehensive to be set forth in detail. Locally, the golfer has the advantage of being handy to Gleneagles, which claims the finest and best-equipped golf courses in Scotland; he has the waters of the Forth close at hand for boating and angling, and many other attractive and, in some cases, historic waters within easy reach, and by rail or road he has ready, convenient and inexpensive access to scores of places of historic and scenic interest. Incidentally, suitable series of local season tickets are issued in the season, providing for travel as frequently as desired between various points, besides standard excursion facilities in great variety and occasional special ones.

Although Stirling is of so great importance as a tourist and traffic centre, and as a resort on its own account, the town itself produces a good deal of business. Thus, it is a great centre for cattle sales, a busy market town, the capital of Stirling County, and it is not only concerned in the distribution of coal throughout a large district, but there are also collieries quite close, near the banks of the River Forth south and east of the station area. There are also extensive timber yards served by railway sidings. Fish and fruit traffic, too, is handled in considerable volume, both on goods and passenger trains. Military traffic is another substantial feature, in that the Castle is the depôt for the Argyll and Sutherland Highlanders, while Detention Barracks, a Military Hospital and the Ordnance Depôt add further responsibilities in this connection.



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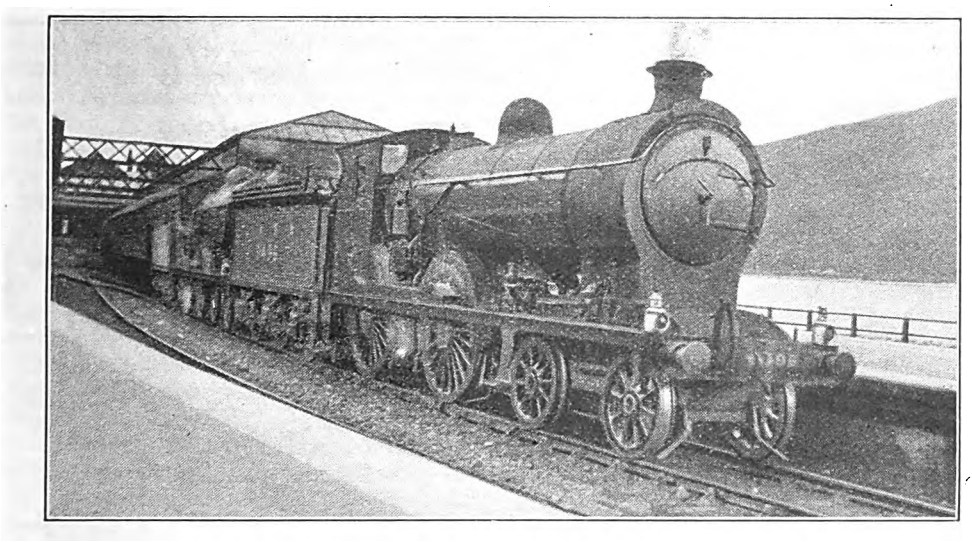

Photo.] GLASGOW TRAIN AT FORT WILLIAM. [*D. B. Bradshaw.*

The West Highland Railway.

By F. S. and A. E. H.

OPINION is about equally divided as to the claims of the Callander and Oban and West Highland lines to be regarded as *the* scenic railways of Scotland, with the late Highland Railway as a close third, in that all three provide inspiring views of mountain and moor, forest and woodland, rushing stream and placid loch, and involve notable engineering works and interesting operating and traffic methods and conditions. All have received attention in these pages on more than one occasion, but they provide so much interest that no apology is needed for further reference, the West Highland section of the L.N.E.R. being selected for consideration in the present article.

Incorporated as a distinct railway, under an Act passed in 1889, the West Highland was worked by the North British Company from the first, in that it started from a junction with that company's line at Craigendoran, and the principal trains were operated through to Glasgow over N.B. metals. Principal historic aspects have been very fully given in previous articles, of which the following may be mentioned specifically :—

"The Mallaig Extension of the West Highland Railway." April, 1901.

"From Craigendoran to Mallaig by Railway." July, 1914.

There have also been several other incidental references.

In that the principal trains run from and to Queen Street (H.L.) station at Glasgow, it will be best to commence the journey here, and to indicate various features of special interest as they arise.

Leaving Queen Street, the famous tunnel with its gradient of 1 in 45 is encountered. Upon emerging from this, the West Highland trains diverge almost immediately from the main Glasgow–Edinburgh line and follow the old North British Helensburgh route. After making a wide sweep round the outskirts of Glasgow, the north shore of the Clyde is followed as far as Craigendoran, where the real West Highland line begins.

Craigendoran (Upper) station, so termed

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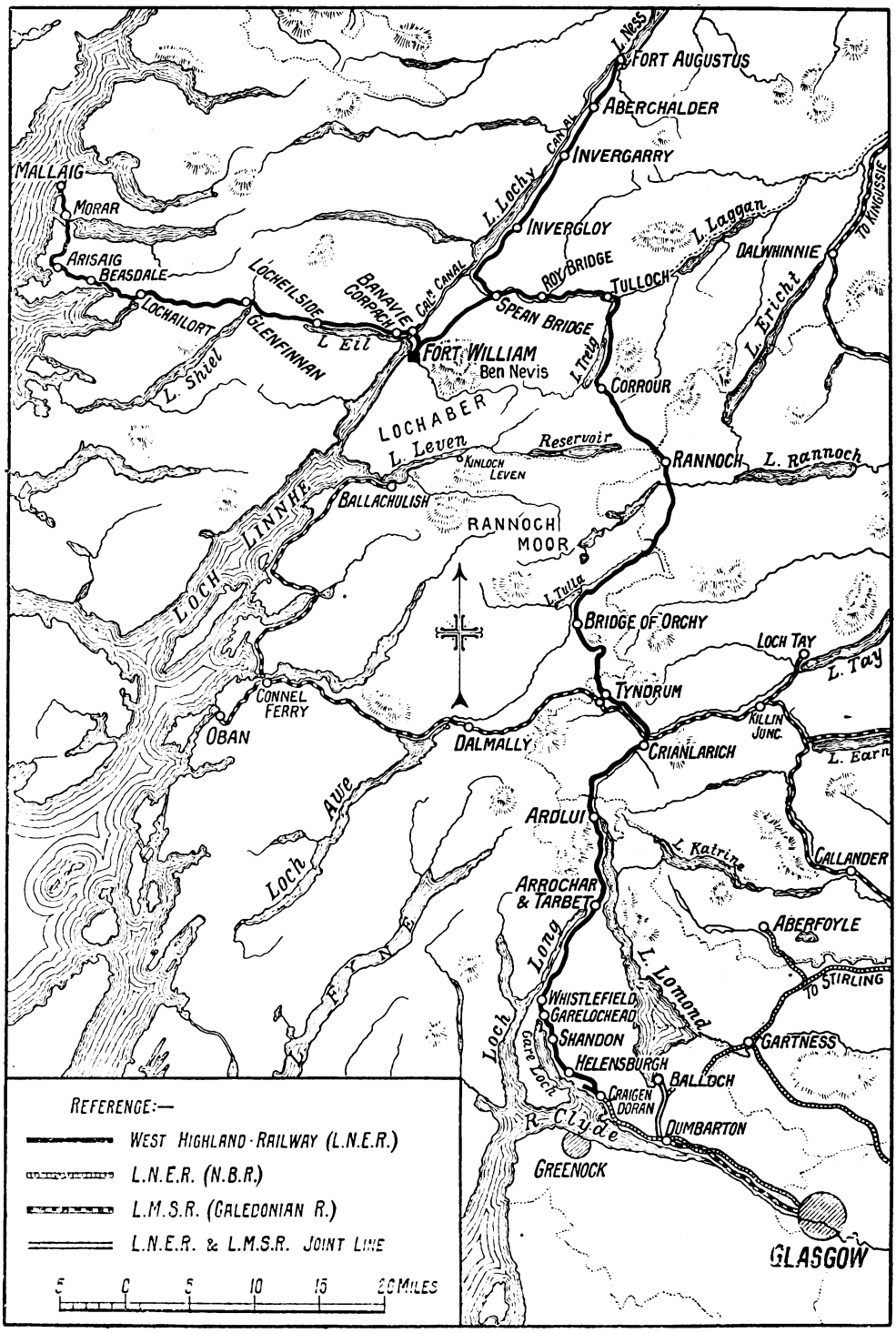

MAP OF WEST HIGHLAND SECTION, L.N.E.R.

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because it is on a higher level than the station on the Helensburgh line, is a single island platform structure. In common with most of the stations on the West Highland, Craigendoran (Upper) is built in an extremely neat way in red brick and ornamental tiles, the style being suggestive of a Swiss châlet. The track being single throughout, except for passing places, is under the control of the electric staff system. Station signal boxes are usually placed on the platforms. Immediately on leaving Craigendoran the line climbs sharply along the sides of Gareloch, a beautiful expanse of water, with beautiful tree-clad slopes. Passing Garelochead, the line cuts across a thickly wooded strip of land to reach Loch Long. The loch is followed for some distance until Arrochar and Tarbet station is reached. A short way past Arrochar the line strikes Loch Lomond.

Once past Ardlui, the scenery steadily grows more wild, and the train, which has been climbing for some time, enters a belt of country practically devoid of trees. Traversing Glen Falloch, Crianlarich station is reached. This is the most important station before Fort William, for all trains stop for about 10 minutes to permit of the engines taking water, while passengers take advantage of the refreshment facilities afforded. A short spur to the L.M.S. Oban line makes Crianlarich an exchange point for goods traffic. For this reason several lines of sidings are provided in addition to the platform roads.

Just beyond Crianlarich a fairly high viaduct carries the West Highland across the L.M.S. line to Oban. A steep decline follows, and the line settles down to pursue a course parallel to that of the L.M.S., although on the other side of an ever-widening valley, until Tyndrum station is passed. The line then curves away northward, and the country passed through is lonely in the extreme. Four miles farther on is the famous "horse-shoe" bend.

The train then climbs once more, hugging the grass-clad slopes of Ben Douran, until Bridge of Orchy station is reached. A little further on, to the left of the line, lies Loch Tulla, with a neighbouring deer forest.

The line now passes on to Rannoch moor, and the traveller has an unforgettable experience. It is impossible to convey in words the impression of the wild ruggedness and solitude of the moor, but the lovely heather-covered mountains surrounding Rannoch Moor are superb in their solitary grandeur. One is glad to be in the train, however, when enjoying this magnificent scenery, for in the 15 miles from Bridge of Orchy to Rannoch, and the 17 miles thence to Tulloch, there is scarcely a sign of human habitation. The railway follows the contour of the land to a great extent, and gradients of 1 in 50 to 1 in 60 are very common. There are also several narrow rock cuttings, made to ease the grade, and numerous sharp curves. Snow fences are provided at the more exposed parts, situated a little distance from the line, for the purpose of checking snowdrifts, which are frequent in winter. An unique feature of the West Highland line is its snowshed—the only one in the country: this is really a rock cutting roofed in with corrugated iron.

The distance between Rannoch and Tulloch stations, the longest station-to-station run in Great Britain, is broken by a passing place at Corrour, which is the nearest railway depôt for the highest shooting lodge in the Kingdom, situated near Loch Ossian. Trains call here as required. Near Corrour the railway climbs to its highest elevation—1,350 feet above sea level. This point, which is approached by steep grades, is marked by white boards on both sides of the line, lettered "Summit of Line."

The line now descends steeply to Loch Treig, often by ledges cut in the solid rock, the scenery meanwhile losing its wildness but not its grandeur. After a sharp curve has been rounded, the loch suddenly comes into view lying far beneath, and, as the line descends rapidly towards the level of the water, magnificent views are obtained of the mountains rising abruptly from the other side of the lake. Loch Treig is interesting as being the source of supply for the Lochaber hydro-electric power scheme. A tunnel 15 miles long is now under construction to Fort William, where a large aluminium works is to be erected. The light railways built in connection with the work of boring this tunnel can be plainly seen from the West Highland trains.

A short distance further and Tulloch

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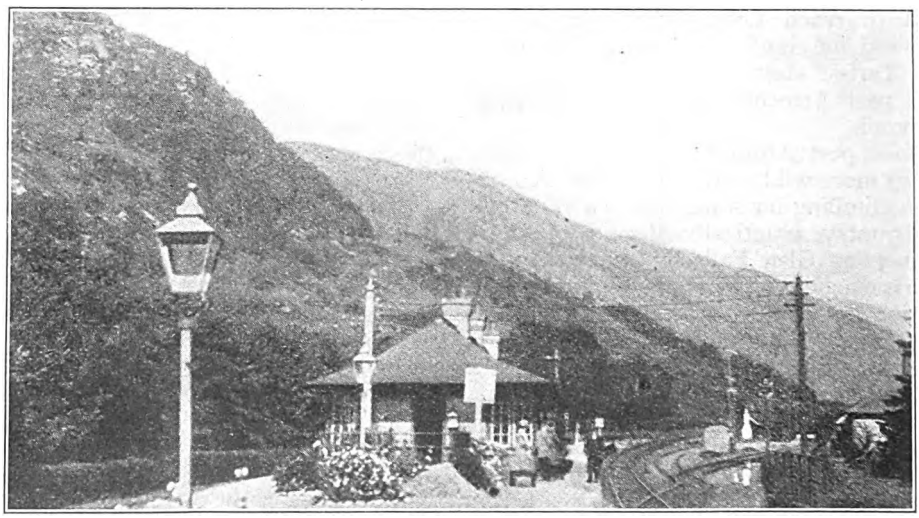
station is reached. From here a motor road goes to Loch Laggan and Kingussie. Although the latter is 25 miles away, the station name boards proclaim it to be the station for Kingussie, though that place has a station of its own on the main L.M.S. line from Perth to Inverness. The latter station, in turn, is stated as being the alighting place for Tulloch !

Turning eastward at Tulloch, the railway traverses Glen Spean, the country again becoming more wooded. On the left, near Monessie, the temporary power house in connection with the Lochaber scheme, mentioned above, is quite near the line. Just before reaching Roy Bridge of the branch on giving an undertaking to the Highland that the feared extension towards Inverness would never be attempted.

Immediately on leaving Spean Bridge the branch dives into extensive pine forests, and follows Loch Lochy and the Caledonian Canal to the terminus on Loch Ness, which is situated quite near that well-known series of locks—Neptune's Staircase—by means of which the canal attains a considerable higher level.

From Fort Augustus steamers ply along Loch Ness to a point near Inverness.

As the Fort William train pulls out of Spean Bridge the disused turntable and



ARDLUI, A TYPICAL ISLAND STATION.

the steepest gradient on the line is encountered, this being a short stretch at 1 in 45 in favour of trains bound for Fort William.

The next station—Spean Bridge—is the junction for the Invergarry and Fort Augustus branch. The station has two platforms, but no bay lines, as most of the branch trains reverse and proceed to Fort William.

The Invergarry and Fort Augustus Railway, to give it its original title, began as an independent concern, and was at first worked by the Highland Railway. But as it was completely isolated from the rest of the Highland system, the North British eventually ended this uneconomical working arrangement by assuming control

engine house, built in the days when the line was a separate concern, can still be seen. Indeed, the branch was very completely equipped, stations and siding lines being provided on a lavish scale. The West Highland train makes a swift run onwards to Fort William, the scenery being beautiful in the density of its pine forests. On the left, also, tower some of the loftiest mountains in these islands, including famous Ben Nevis, the monarch of the Scottish "Bens."

Shortly before striking the shores of Loch Linnhe, Mallaig junction is passed. This, as its name implies, is the point where the Mallaig extension comes in. As, however, the junction is in the running direction towards Fort William, trains

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from the south have to reverse there before starting on the last stage of their journey. Fort William station, which is about a mile farther on, is approached by a causeway built over the waters of the loch. The station, being on the waterside, is rather cramped, and the three platform roads provided are apt to become congested in the peak of the summer traffic, whilst the fact that all shunting movements have to be carried out over the speed-restricted causeway does not help matters.

With a fresh engine attached to what was the rear of the train, those carriages which are going forward the whole distance soon reach Mallaig junction and commence

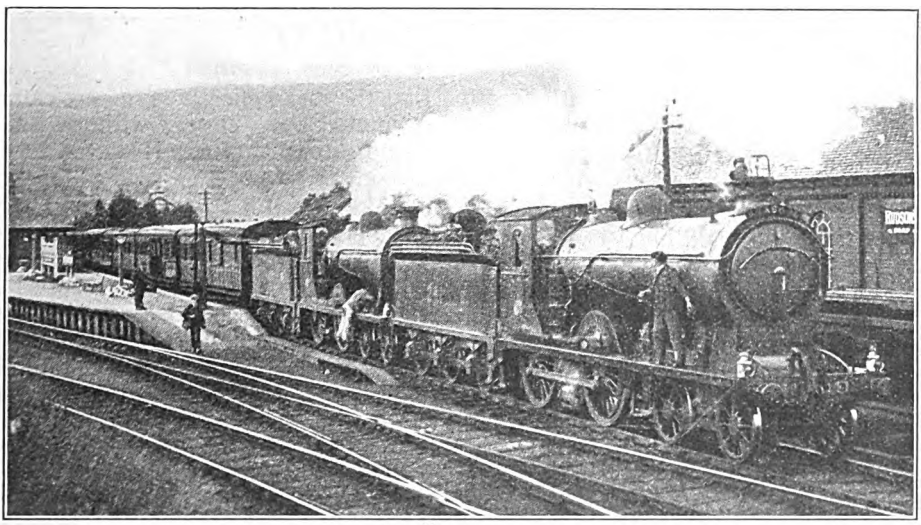

Photo.] WEST HIGHLAND TRAIN AT CRIANLARICH. [*E. Cummins.*

the last section of their run. In a short while the Caledonian Canal is reached. This famous waterway is crossed by a swing bridge, beyond which there is a short branch to Banavie Pier, which is the summer terminus of the Canal steamers, although in winter they stop some distance short, at Fort Augustus. Onwards past Banavie and Corpach the line follows the northern shore of Loch Eil, which provides a beautiful but very wild view of the mountains on the other side.

Past Locheilside station the line leaves the loch and crosses a narrow neck of land by means of a rock cutting, which eventually deepens into a tunnel. On leaving this, the line leads out on to the gracefully curved Glenfinnan Viaduct. From this point a most wonderful view of Loch Shiel is obtained, stretching away down the length of the loch, and generally considered to be the most wonderful scene on the whole line. Round the whole sweeping curve of the viaduct the loch is in view, and its beauty can still be seen when the train draws up in Glenfinnan station.

For practically the whole way on to Mallaig the line is a succession of rock cuttings and ledges, blasting having been resorted to in order to clear a way for the track. The next station of interest is Beasdale, which has the distinction of being one of the few stations in this country under the control of a "station mistress." The post would not be an enviable one even for a man, for the halt is very isolated, and trains stop only by special request.

Past this interesting spot the scenery has no features of outstanding interest, but the extreme difficulty of construction that must have been experienced is at once apparent. It is not long, however, before the Atlantic comes in sight, and the traveller has his first glimpse of the open sea. Seldom far from the shore, the line winds on to Mallaig. As the terminus was approached the engineers' task became more and more difficult, but the objective was gained in the end, and trains now

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steam into Mallaig after a run of only 6 hours' duration from Glasgow.

Strictly speaking, the line does not end at Mallaig station, for a branch runs round the buildings and down to the quay. The breakwater that protects this was constructed by the railway company. Steamers leave at fixed times for Skye and the Western Islands, and numerous trawlers make Mallaig their home port, whilst many others call regularly in order to land their catches. Special fish trains are run on the West Highland line, as required, to cater for this traffic.

Throughout the journey of 160 miles from Glasgow to Mallaig the traveller cannot help being struck by the endless variety of the panoramas unfolded before him, and this forms an added inducement for the railway enthusiast to visit what is technically one of the most interesting railways in the kingdom.

TRACTIVE EFFORT.

In view of the frequency with which inquiries as to the tractive effort of locomotives are received, although the formula has been given and explained many times, we think it desirable to give it once more, and, finally, in the form of a page which will obtain index reference, and which can be easily turned up. Readers will thus be enabled to work out the desired figures on their own account.

The following letters are conventionally used thus :—

d = diameter of cylinder in inches.
L = stroke in inches.
P = mean effective steam pressure, usually taken as approximately 85 per cent. of the boiler pressure.
D = diameter of driving wheel in inches.
T = tractive effort in pounds.

For an ordinary two-cylinder engine the formula is then applied as follows :—

$$T = \frac{d^2 LP}{D}$$

For a four-cylinder non-compound engine the result has to be doubled, while multiplication by 1·5 will cover a three-cylinder locomotive.

Compound Locomotives.

In the absence of indicator diagrams, the calculation of tractive effort for compound locomotives must necessarily give a somewhat approximate result. The difficulty here lies principally in the fact that the mean effective pressure cannot be estimated very closely without reference to indicator diagrams. However, for an approximate estimate proceed as follows :—

Take the M.E.P. for the H.P. cylinder at 65 per cent. of the initial boiler pressure, and that for the L.P. cylinder, or cylinders, at 25 per cent. of boiler pressure. Refer the M.E.P. for the H.P. cylinder to the L.P. cylinder, and assume that all the work is done in the L.P. cylinder or cylinders. This is done by dividing the M.E.P. of the H.P. cylinder by the ratio of the volume of the L.P. cylinder, or cylinders, to the volume of the H.P. cylinder ; then add to this figure the total M.E.P. of the L.P. cylinder, or cylinders, and with this result as a value for P, proceed as for a simple engine, thus :—

$$T = \frac{d^2 LP}{D}$$

where L = length of L.P. stroke in inches,
d = diameter of L.P. cylinder in inches,
and D = driving wheel diameter in inches.

By paying careful attention to the argument as above set out readers will be able to calculate for themselves the tractive effort of two-cylinder compounds, also four-cylinder compounds having two H.P. and two L.P. cylinders, and three-cylinder compounds having one H.P. and two L.P. cylinders as on the L.M.S.R. Midland section.

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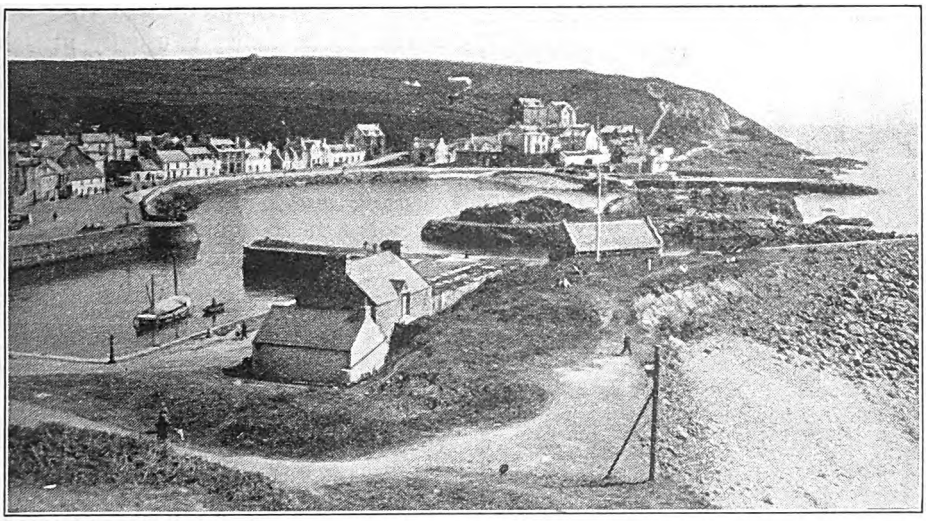

GENERAL VIEW OF PORTPATRICK HARBOUR.

Through "Bonnie Galloway" by the L.M.S.R.

By "INDICATOR."

GENERALLY familiar to many thousands of passengers utilising the "Short Sea Route" to Ireland via Stranraer and Larne, the fact that the Scottish portion of the journey is usually made during the hours of darkness, except during the summer months, when the popular day service is also operated, entails that the geographical, railway and scenic characteristics of the "Bonnie Galloway" stage are by no means as well known as in the case of other important traffic routes, though during some ten or twelve weeks in the summer the day service is used by very large numbers of passengers, and a "trip across" is a favourite and entirely enjoyable excursion, and is included in many of the tours arranged by the L.M.S.R. Dumfries, Castle Douglas and Newton Stewart are, however, important centres for agricultural traffic, with a modicum of manufacturing industry; Kirkcudbright, "The Torquay of Scotland," and Wigtown combine with their attractions as favourite residential towns the responsibilities of county capitals; Stranraer is an important place locally; Whithorn and Portpatrick, in addition to some of the towns mentioned, are interesting seaside resorts of the quiet kind, while the whole of Galloway teems with history and romance and the districts served figure largely in literature and poetry, many in the romances of Sir Walter Scott, S. R. Crockett and other novelists and writers.

Further, quite a number of the intermediate stations, both on the main line and the branches, are recognised as constituting good centres for touring, notably Dalbeattie, Castle Douglas, New Galloway, Gatehouse of Fleet, Newton Stewart and Stranraer itself, while the angler and the golfer cannot fail to find satisfaction. Several important "coach roads," on some of which organised motor services are operated, facilitate touring away from the actual rail routes. Moreover, while the line does not provide the same interest and grandeur as do the great "mountain" branches of Scottish railways further

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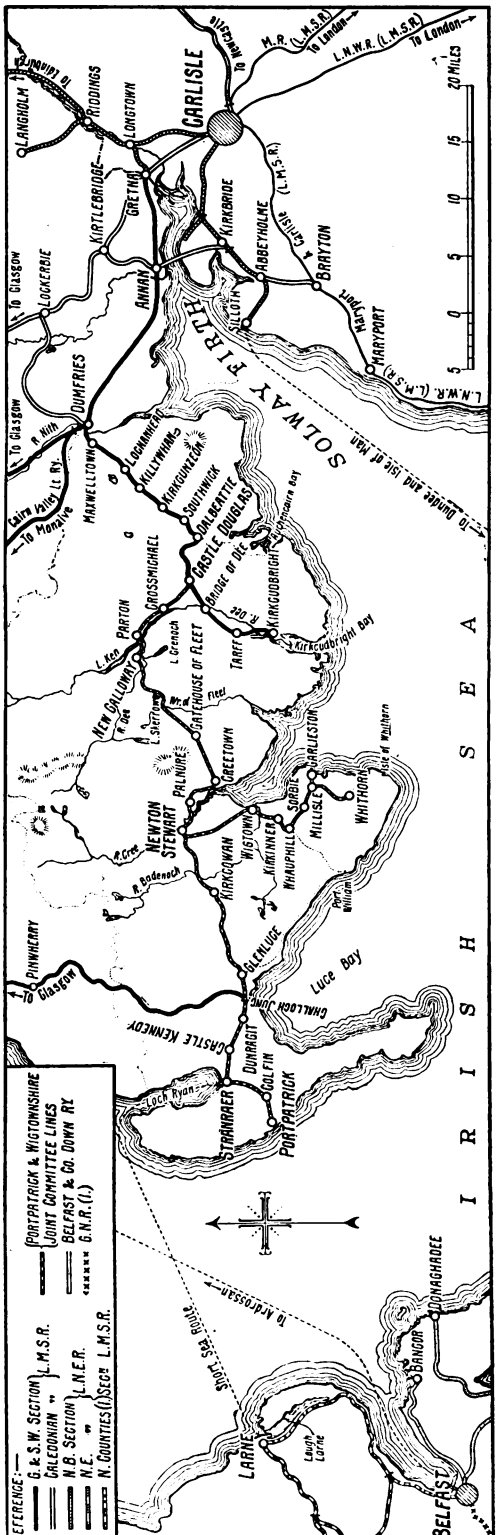

north, the traveller is usually in sight of the "Southern Highlands," including a number of peaks of considerable height, several picturesque lochs come into view, and, near New Galloway, Loch Ken is actually crossed by a notable railway viaduct, and here and there a winding river is a near companion to the railway or is spanned amid attractive scenic surroundings.

Although now referred to as the Portpatrick and Wigtownshire *Section* of the L.M.S.R., it is necessary to explain here that it is only since grouping that it has been correct to refer thus collectively to the whole of the route from Dumfries to Stranraer and Portpatrick, with the branches. Prior to grouping, the stage from Dumfries to Castle Douglas and the branch to Kirkcudbright belonged to the late Glasgow and South Western Company, and it was only the Castle Douglas-Stranraer-Portpatrick section, with the Whithorn branch, which was under the control of the Portpatrick and Wigtownshire Joint Committee. This committee was set up in 1885 to correlate the interests of the London and North Western and Midland Railways in England and the Caledonian and Glasgow and South Western Railways in Scotland, which, from that date, took over jointly the original Portpatrick and Wigtownshire Railways. One of the component companies which were then dissolved, the Portpatrick, was opened from Castle Douglas (connecting with the line from Dumfries, completed by the Glasgow and South Western Railway in 1860) to Stranraer in 1861 and extended to Portpatrick in 1862.

At one time, Portpatrick was regarded as a suitable port for steamer services across to Ireland at Donaghadee. Great things were expected of Portpatrick as a port and important works were undertaken to equip it for cross-Channel traffic to Donaghadee. About £500,000 were, in fact, expended by the Government of the day on harbour and protection works, mostly now in a more or less derelict condition, though the small harbour is still used by local craft, and wireless and coastguard stations, &c., continue in active service. From this port mail packets, at one time, crossed regularly to and from Donaghadee, and

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there was a large customs house and accommodation for troops *en route* to or from Ireland.

In 1865, however, it was decided that Portpatrick, and in a lesser degree Donaghadee, were unsuitable for further development for cross-channel traffic, and the route was discontinued in favour of that between Stranraer and Larne. The Portpatrick line was, by the way, originally promoted under the grandiloquent title of the "British and Irish Grand Junction Railway," another example of the early fashion for using the word "Junction," or its magnified form "Grand Junction," to emphasise the fact that the railway in question provided the esssential connecting link between other systems.

The Portpatrick and Wigtownshire Joint Railway also took over the Wigtownshire Railway between Newton Stewart and Whithorn, with the Millisle branch, opened from Newton Stewart to Wigtown on April 3, 1875, thence to Millisle on August 2, 1875, a "tramway" from Millisle to Garliestown, April 3, 1876, and Millisle to Whithorn, July 9, 1877. In 1877 the Wigtownshire Railway Company was authorised to abandon the tramway and construct a branch line to the harbour at Garliestown. This branch was closed for passenger traffic in 1903, though goods traffic is still operated. The Portpatrick Railway also had a harbour branch at Portpatrick, long since abandoned. An important link is the Glasgow and South Western line from Girvan to Challoch Junction, between Dunragit and Glenluce stations, by which a through route to and from Glasgow via Ayr is available. This was opened in 1877.

For further historical particulars readers may be referred to a very full and interesting article by Mr. J. Ferguson Walker, published in the August, 1900, issue of THE RAILWAY MAGAZINE, and to a further contribution in the January, 1912, number. It will be sufficient to mention here that the transfer of the Portpatrick and Wigtownshire Railways to the London and North Western, Midland, Caledonian, and Glasgow and South Western Railway Companies was made under the Portpatrick and Wigtownshire Act of August 6, 1885. The operating arrangements were, however, somewhat peculiar, in that whereas the Portpatrick Railway was worked at one time by Caledonian and Glasgow and South Western locomotives supplied in equal numbers, the rolling-stock being "hired" from one or other of these companies, except for the through boat trains which were operated by the Glasgow and South Western Company to and from Carlisle, the Wigtownshire Railway hired engine power at an hourly rate. Under the joint committee, at various periods one company ran the passenger trains (again excepting the boat trains, which have always been run by the Glasgow and South Western Company) and the other the goods trains, or each operated all traffic for periods of alternately three years. So far as the writer can ascertain, neither the London and North Western nor the Midland Railway ever supplied either engines or vehicles, though they have always provided most, if not all, of the coaches for the through boat expresses, including the sleeping cars on the night trains.

For traffic purposes it is best to regard the Portpatrick and Wigtownshire line as starting at Dumfries, though, as already explained, the section thence to Castle Douglas, with the Kirkcudbright branch, was, prior to grouping, purely Glasgow and South Western. There were, and are, a few trains which serve only these sections, but for general purposes Dumfries is the junction for the line and most of the trains run to and from that station. This course is further justified in that the bringing of the four railway parties to the Joint Committee into the same group has removed any necessity for considering Castle Douglas as a "division point," so that now the whole of the branch can conveniently and correctly be considered as one section.

Dumfries station has two main platforms and bay lines at the north end on the down side, and one of these is generally used by Stranraer line trains which, by means of separate up and down lines parallel to the main lines, have a clear run into or from the station, though the actual junction is about a quarter of a mile to the north. Curving away from the main lines, the Stranraer branch, as we may appropriately term it in future reference, crosses the river Nith, giving, from

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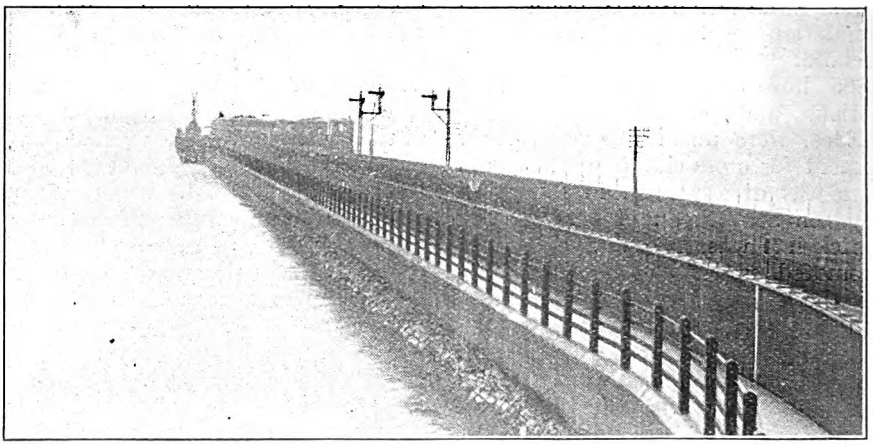

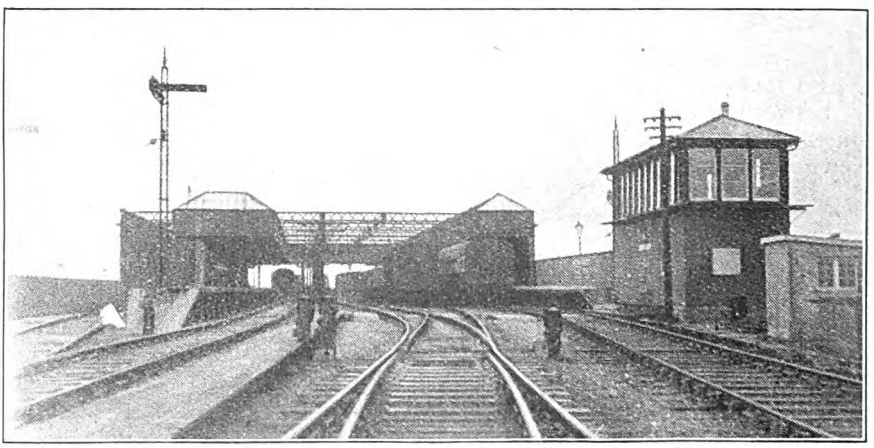

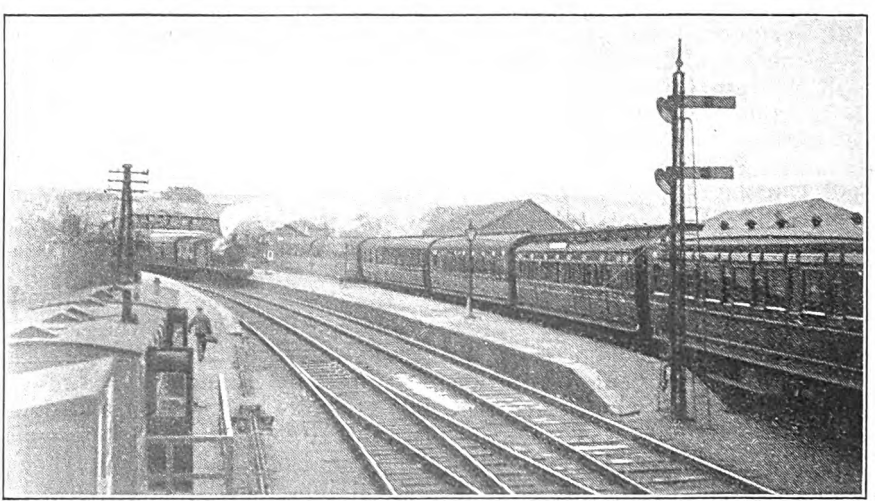

Photo.] [*J. F. Gairns.*

1.—RAILWAY PIER AND HARBOUR STATION AT STRANRAER.
2.—GENERAL VIEW OF HARBOUR STATION.
3.—STRANRAER TOWN STATION.

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the bridge, an attractive view of a picturesque reach of that interesting river.

A short run and Maxwelltown station is reached. The next stage, to Lochanhead station, gives some glorious views over undulating and well-wooded country, though an occasional rock cutting indicates that construction was not always easy, while one or two viaducts, notably that at Goldielea, are necessary to cross valleys. In places, indeed, the line is carried along a ledge cut from the hillside. At Lochanhead we are well into the hills, though past Killywhan the general character of the country is flat agricultural land, with moorland here and there. At Kirkgunzeon rock cutting again appears, while the gradients are as steep as 1 in 80 in both directions on this section.

Dalbeattie, on the river Urr, puts forward a claim to be known as the "Granite City of the South." Here there are granite quarries (a cable way may be noted near the station), though Dalbeattie—"The Valley of the Birches"—is a tourist centre and holiday resort of some importance. From the station there is a "coach road," one of many in Galloway constructed under Government auspices, to the coast at Auchencairn Bay. Beyond the station the railway is carried over the river by a viaduct.

After a run of 5¼ miles Castle Douglas is reached, the most important market town in Galloway and in considerable favour as a centre for the tourist, the golfer and the angler, also those who find their best recreation in the pleasant country side, among the hills and rivers or on the moors. As this is the junction for the Kirkcudbright branch it has accommodation for connecting trains, while its importance as a traffic centre and as serving a fair-sized market town calls for goods and carriage sidings, goods and engine sheds, and cattle pens and a turntable. It has, therefore, on the up side an island platform, so that connecting up trains can exchange passengers, parcels, &c., conveniently, while on the down side the main line platform is extended beyond the branch points, so that, if need be, though this is not generally necessary, the Kirkcudbright train can be placed at the platform beyond the junction clear of the main line route, thus enabling changing passengers to pass along the platform from one train to the other.

Thus far the route traversed has been all double-track, but for the rest of the way to Stranraer is single track, except at stations, controlled by electric train tablet apparatus. Tablets are exchanged at speed in the case of express trains such as the boat expresses. As the chief of these run during the night or the very early morning, requiring the main line to be open for the greater part of the 24 hours, in addition to the ordinary tablet system, long section tablet apparatus is installed to reduce the number of exchanging stations when few trains are being operated.

Approaching Crossmichael, the River Dee comes into sight alongside and remains a close neighbour until it widens into Loch Ken. Thence to Parton (non-crossing station) the waters of the Loch are in full view on the left until it is crossed by the Parton viaduct, the biggest engineering work on the line. This consists of three bowstring girder spans, and is of considerable magnitude in design and construction, though it carries only a single line.

The Loch then continues north, though as we leave it, beautiful views are presented along the Ken Valley. But although the Loch is thus left, the railway continues to have as its close companion the "Black Water of Dee." A glimpse of Loch Grenoch and New Galloway station is reached, the centre for "Crockett-land" and for many interesting tours, including a "long trip" from Glasgow by road from Dalmellington via Carsphairn and Dalry.

Still in close company with the "Black Water of Dee," until it passes away to the north-west as the railway crosses it, the route becomes more and more of a moorland character, involving a stiff climb, mainly at 1 in 80, to Loch Skerrow. Here there are short wooden platforms, though the station does not appear in the public time-tables, and most of the stopping trains call not only to meet the needs of such traffic as there is in this bleak and wild district, but also, in the case of heavy trains, to allow the engines to take water, in view of the long pull to this point in both directions, though Gatehouse of Fleet is the actual summit point of the Castle Douglas-Newton Stewart stage. Close

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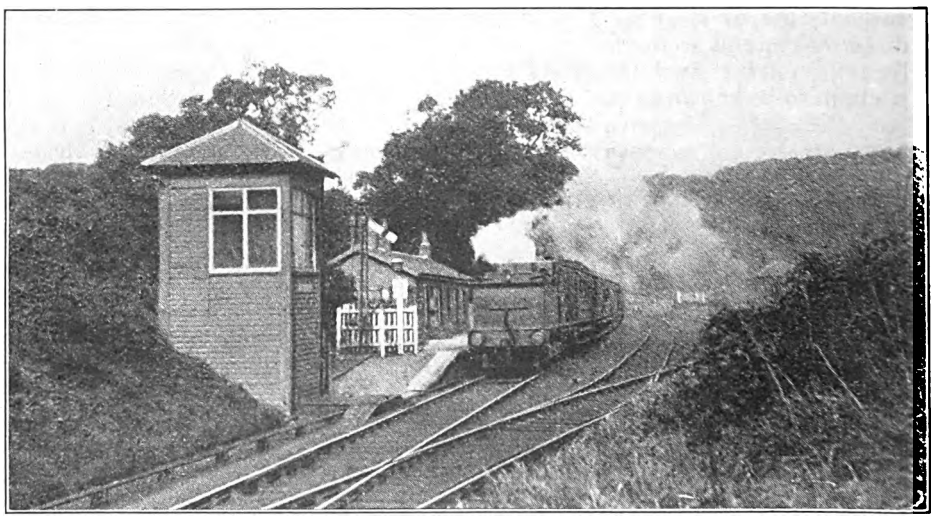
alongside is Loch Skerrow, while below the platforms passes a rushing stream.

A stretch of level and a short down grade, across rock-strewn moorland, lead to a mile ascending at 1 in 76, followed by a corresponding descent to the final grade of 1 in 78 to Gatehouse of Fleet station. On the way the "Water of Fleet" is twice crossed by viaduct, once as the Little Fleet, and once as the Big Fleet, but wild moorland conditions continue, rock cuttings and embankments abound, until, at Gatehouse of Fleet, signs of habitation once more appear. The town of Dromore, which it serves, is a favourite tourist centre, and offers many attractions. A coach service is maintained from the station to Gatehouse of Fleet, itself a good many miles to the south by mountain road, though it was found desirable some years ago to give the station, previously known as Dromore, the same name as the place to which it provides access.

Then follows a long descent, at 1 in 80, for over 6 miles, past Creetown, nearly to Newton Stewart, though the final mile and a-half is steeply ascending. Passing Glenquicken Moor, and with picturesque bits here and there, at Creetown moorland is left behind for the time being, and, instead, the fertile valley of the Cree is traversed. Glimpses of the estuary of the Cree are had in passing, and beyond Palnure station the river is crossed by a low viaduct, whence good views of fairly wide and picturesque stretches are had. Nearing Newton Stewart an interesting view of the town is given as it lies in the valley of the Cree to the right.

Newton Stewart is claimed to be one of the most picturesque places in Galloway, amid magnificent surroundings. It is well sheltered, amid protecting hills, and is a fine centre for excursions, while the river is known as the "Silver Cree." The station has, on the up side, an island platform, as at Castle Douglas, for arriving branch trains from Whithorn and Wigtown, with a single platform on the down side. The main line continues through agricultural country to Kirk-



TRAIN AT PORTPATRICK STATION.

cowan, on the way crossing the river Bladenoch by a bowstring girder bridge. At Kirkcowan there are woollen factories, though the place is also a centre for dairy traffic and honey. Another stretch of moorland, with some fairly stiff climbing to an intermediate summit, and Glenluce is reached, a favourite place for visitors. Leaving the station a picturesque view is had of the old road bridge which parallels that carrying the railway. Glenluce is another centre for "coach road" traffic, and as the line nears the coast a passing glimpse is had of Luce Bay, with its wide stretches of sand.

At Challoch Junction the Girvan line comes in, single track on the main line

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but double track on the branch at the actual junction, which can thus be used for crossing purposes if need be. A little further on, after passing one of the chief establishments of the United Creameries Company, Dunragit station is reached. Castle Kennedy is the next station, serving another tourist and holiday centre, and after a glimpse on the left of Loch Magillie, and beyond it Soulseat Loch, the vicinity of Stranraer is reached. Here the original line bends to the left into Stranraer Town station, while a fairly steeply graded single line branch leads down to the harbour and Pier. All town business is, however, done at the town station, and here are extensive goods and carriage sidings, goods warehouse and two engine sheds. At one time these were devoted respectively to the Caledonian and the Glasgow & South Western companies, each having its own staff and locomotive foreman. Now, however, they are used as convenient, though sufficient engines are attached to Stranraer to keep both sheds in use. As the most important town in south-west Scotland, an important centre for agricultural, market and general goods traffic, the goods accommodation at Stranraer is considerable, and two or three engines (mostly Stirling 0-4-2 tender locomotives) are generally engaged on shunting duties. Coal is also handled on a fairly large scale to meet the requirements of the district. Here were located the offices whence the Joint Committee was administered, though Mr. J. McCleary, station master at the Town, and Mr. J. H. Smith, station master, harbourmaster and agent at the Harbour, cover local responsibilities, while Mr. W. Hampton, district traffic inspector, supervises the operation of the section as a whole. The Town station is on a curve, with a back road behind the up platform, generally used to stable the sleeping car and mail trains during the day for convenience in cleaning and other attention. There is also a short bay at the further end of the up platform at which the Portpatrick local train can be placed if necessary.

Proceeding down the branch for about a quarter of a mile, the single line is first paralleled by a track on which cattle and coal wagons can be stabled, and just before crossing the public road near the end of the pier the cattle lairages may be noted. A very big cattle traffic from Ireland is conveyed by the Stranraer and Larne steamers (Stranraer & Larne Steamship Company, four-fifths owned by the L.M.S.R. as successor to the interests of the pre-grouping companies, including those of the Northern Counties Committee in Ireland), and for this traffic there is an enclosed path from the steamship berth right along the pier. To prevent any contact between the cattle and people, or animals using the public road, a travelling bridge, running on rails, can be drawn across the roadway when cattle are passing from steamer to lairage. The latter premises are well laid out, with rest stables, "hospital ward" and pens for the animals whence they are loaded to cattle wagons for rail transit. Office and other accommodation is provided for the staff of the Department of Agriculture and their inspectors.

The old harbour is not suited for vessels of heavy draught. The railway pier, however, goes sufficiently far out, allowing also for the extensive dredging which has been carried out, to enable quite big vessels to come alongside at all states of the tide, while justification for describing Stranraer as "a safe haven," lying as it does at the head of Loch Ryan and protected for a considerable distance, is afforded by the fact that the Stranraer and Larne steamship service is enabled to be maintained even in the heaviest weather. The vessels employed are quite big steamships, with a passenger accommodation of no less than 1,367 each (an indication of the scale upon which traffic passes), and they have extensive space for goods and cattle, dining and other saloons for each class, and a considerable number of staterooms. There have, of course, been several generations of steamers on this service, but those now employed are the *Princess Maud*, built in 1904, and the *Princess Victoria*, built in 1912. Both are triple-screw turbine vessels, 300 ft. in length, and designed for a standard speed of 18 knots.

The pier carries two lines of rail, together with a public road and the enclosed cattle path. The harbour station has two long main platforms, with two carriage lines between. On the down side there is also a shorter bay platform. Three trains can thus occupy the station simultaneously.

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On the main platform there are refreshment rooms, booking office, parcels office, &c. The whole is roofed over, except for the intermediate lines. Passengers have only a few yards to cover in passing between train and steamer, while electric hoists deal quickly with train luggage to and from the steamers, and with general goods at other periods.

Apart from its importance as a cross-Channel station, and as a local market town and traffic centre, Stranraer has many attractions to offer the tourist and holiday maker. This applies especially in regard to boating, in that the enclosed waters of Loch Ryan provide for yachting, boating, bathing, &c., while the surrounding district is full of interest. Coach and motor tours, golfing, &c., also count for a great deal, while every holiday visitor naturally takes at least one trip across to Ireland, for which cheap excursion fares are charged. Loch Ryan is, indeed, an interesting stretch of water, and its passage by the cross-Channel steamers constitutes by no means the least interesting portion of the trip, which involves only about an hour on the open sea, the final stage on the other side being within the shelter of Lough Larne.

Returning to Stranraer Town station, it is necessary to consider the final section to Portpatrick, a pleasant little resort which attracts considerable numbers of day trippers and not a few holiday visitors. The branch train which runs between Stranraer and Portpatrick has a steep climb of about 5 miles continuously at 1 in 72 and 1 in 75 to Colfin, the only intermediate station. The land is steadily rising and of a pastoral, undulating character, very picturesque in places, and one or two viaducts are required to cross the valleys. Glimpses are also had of the Bay of Luce. Alongside the station at Colfin is a large creamery, where the familiar churns used in Galloway are much in evidence.

Colfin is the summit, but the descent is even more severe than the ascent, over two miles at 1 in 59. The country gets wilder until the line comes out above the cliffs, giving a magnificent view over a rock-bound coast, the open sea, and the diminutive village and harbour of Portpatrick. Crossing a rocky gorge and passing the ruins of Dunskey Castle, and traversing rocky cuttings, the terminus is at length reached. The line is still a fair height above sea level, so that the station is, as it were, perched on the hill-side. It is, however, quite handy for the little town and harbour, also for the hotels which cater for visitors. The harbour is, as already explained, small, and is somewhat disfigured by the derelict character of works remaining from the days when it was thought that Portpatrick could be made an important cross-Channel port. The rocky coast and the wind-swept headlands—attributes which attract the visitor—show clearly that Nature can be very severe in her sterner moods. Traces can still be seen of the old steep branch down to the harbour, though this is now abandoned. The station has a neat single platform, with two or three sidings and goods lines and a small engine shed.

It is now necessary to transfer attention to Newton Stewart and the Whithorn branch, the old Wigtownshire Railway. The branch is, of course, single track. The first stage is a long one, of seven miles, to Wigtown, the county town, "a city set on a hill." The line traverses moorland and then grazing land, of a character not calling for an intermediate station. It skirts the higher part of the town of Wigtown, coming close to the waters of Wigtown Bay, of which, however, only passing glimpses are had. There is only one platform, but fairly extensive goods accommodation.

The next station is Kirkinner, near which some fine views are to be had, and a mile or two further on is Whauphill station. A coach service runs from the station to Port William, on Luce Bay. Sorbie is another centre of the activities of the United Creameries Company. Millisle is the station for Garliestown, a pretty little place at the head of a pleasant bay. Originally a "tramway" was constructed to connect the two places, and later a branch line was constructed. This has, however, been closed for upwards of twenty years, but is still used for goods traffic down to the little harbour at Garliestown. It leaves the main line just before Millisle station is entered. The final stage brings us to the terminus at Whithorn, a single-platform station with goods and engine-shed accommodation, &c., but in no way distinctive. Whithorn is a place

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of venerable antiquity, and, though there is not a great deal in the place itself, attracts sufficient visitors to justify the running, every summer, of a through coach to and from Edinburgh. The real attraction is, however, the little seaside resort known as "Isle of Whithorn," three miles by road from the station, and considerable numbers of visitors come every summer for bathing, boating, touring and other holiday avocations.

Continuing our return journey still further, a short trip may be made over the Kirkcudbright branch from Castle Douglas.

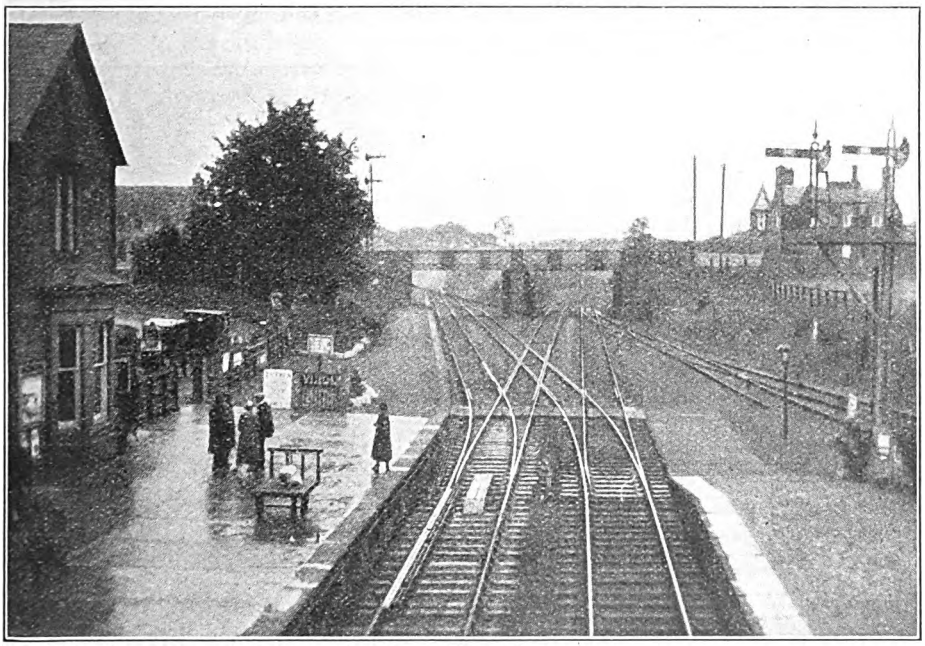

Photo.] [*R. D. Gauld.*

CASTLE DOUGLAS STATION: KIRKCUDBRIGHT BRANCH TO LEFT.

The first stage to Bridge of Dee, where the river is crossed, is quite picturesque. The same applies as far as Tarff, while the final run to Kirkcudbright becomes most interesting. About midway the river is again crossed by a viaduct, calling for speed reduction, while directly alongside is the old road bridge. Views of the upper reaches of the Bay of Kirkcudbright beyond and at the point where the Dee runs into it add interest, and as we approach the terminus wide stretches of water come into view. The station is of the old-fashioned type, platform and run-round lines being under cover, adjoining the station buildings. Alongside is a goods shed and fairly extensive goods accommodation almost filling up the area between the railway and the water-side. Kirkcudbright has much of interest, apart from its local importance as the county town, while, like so many other places mentioned, it offers tourist and holiday facilities. It is also a favourite centre for artists.

Finally, before referring to train services and traffic working, it may be mentioned that there are golf-links at Portpatrick, Stranraer, Glenluce, New Galloway, Kirkcudbright, and Castle Douglas, and at Port William (Whauphill station), Newton Stewart, Whithorn and Kippford (Dalbeattie).

The most important trains are, of course, the services to and from Ireland, and of these the chief are the through boat trains. In summer, the down train leaves Euston at 8 p.m. (except Saturdays) as a complete train, calling at Bletchley, Rugby, Crewe and Wigan, reaching Carlisle at 2.32 a.m. It is then taken on by a Glasgow and South

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Western engine at 2.40 a.m., and with stops at Dumfries, Castle Douglas and Newton Stewart, runs direct to Stranraer Harbour, due at 5.42 a.m. In winter the Stranraer through coaches and sleeping car are attached to the 7.40 p.m. from Euston, in combination with Aberdeen and other Scottish sections.

There is, however, a second train from Carlisle at 3.13 a.m., calling at Annan, Dumfries, Dalbeattie, Castle Douglas and Newton Stewart, also running direct to Stranraer Harbour (6.19 a.m.). This follows from Carlisle the Postal Train, and brings the mails for Ireland via Stranraer and Larne. It also conveys a through carriage for Stranraer brought by the 12.40 a.m. L.N.E.R. non-stop train from Newcastle to Carlisle, thus giving Newcastle a service to and from Ireland of considerable importance, for mails and parcels as well as for passengers. This arrangement applies for the nights of Monday to Friday inclusive. On Saturday nights there is no service, but on Sunday nights, though passengers can use the 7.30 p.m. from Euston, the Stranraer through carriage and sleeping car are attached to the Postal Train at 8.30 p.m. No intermediate stops are scheduled, so that only through passengers from London have this facility, but the calls made by this for postal purposes may be mentioned: Rugby, 10.5-10.8 p.m.; Tamworth, 10.40-10.47 p.m.; Crewe, 11.44-11.57 p.m.; Preston, 12.57-1.7 a.m.; Carlisle, arr. 2.53 a.m. From Carlisle the London vehicles then go forward on the 3.13 a.m. from Carlisle, though the 2.40 a.m. train is still run, and takes, instead of the 3.13 a.m., the Newcastle-Stranraer coach. A principal reason for these arrangements is to obtain a convenient distribution of the load, in that the composite 7.30 p.m. on Sunday nights from Euston is rather too heavy to take also the Stranraer portion (hence its attachment to the Postal), while there are parcels vans and miscellaneous vehicles which are run (with the Newcastle coach) on the 2.40 a.m. on Monday mornings, and on the 3.13 a.m. on other days.

WHITHORN STATION.

The transhipment of passengers and luggage is rapidly carried out at Stranraer harbour, so that, unless there is undue pressure, the steamer can usually get away fairly closely to 6.30 a.m., and, as a rule, Larne Harbour is reached to time at 8.45 a.m., so that the boat express at 8.55 a.m. non-stop is generally able to give a reasonably punctual arrival at York Road station, Belfast, due 9.30 a.m. Incidentally, steamer passengers have a pleasant trip across, with the opportunity to have a good breakfast in the saloon, and can proceed at once with their business or other avocations on reaching Belfast.

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The return service leaves Belfast at 6.25 p.m. and Larne Harbour at 7.12 p.m., the steamer reaching Stranraer Harbour at 9.20 p.m. In this direction the same arrangements apply every day, except that there is no service at all on Sundays, the boat train leaving at 9.42 p.m. and conveying both the London and the Newcastle vehicles, miscellaneous traffic being carried by a train leaving the Harbour at 10.32 p.m. The main train calls at Newton Stewart, Castle Douglas and Dumfries, and reaches Carlisle at 12.42 a.m. The Newcastle coach goes forward as a non-stop express at 1.27 a.m., while the London vehicles are attached to the 12.57 a.m., due at Euston at 7.15 a.m., in combination with the 10.30 p.m. sleeping car train from Edinburgh to London.

In summer there is a further boat service, in connection with the 10 a.m. ex Euston, leaving Carlisle (with restaurant car) at 4.12 p.m., calling at Dumfries, Castle Douglas, New Galloway and Newton Stewart. This also runs direct to the Harbour at Stranraer, due 7.15 p.m., and a steamer leaves at 7.30 p.m., reaching Larne Harbour at 9.45 p.m., the Belfast arrival being 10.40 p.m. The corresponding service leaves Belfast at 9.5 a.m., Larne Harbour at 9.55 a.m., and reaches Stranraer at 12.3 p.m. The train leaves at 12.15 p.m. (with restaurant car) for Carlisle, calling at Dunragit, Newton Stewart, New Galloway, Castle Douglas, Dalbeattie, Dumfries and Annan, and at Carlisle connects with the West Coast express, due in Euston at 10 p.m.

From Glasgow, via Ayr and Girvan, there are also connections with the steamer services. When the 7.30 p.m. steamer is running from Stranraer, Glasgow passengers travel by the 3.55 p.m. from St. Enoch, and reach Stranraer Harbour (restaurant car from Ayr) at 7 p.m. They can also use, and this applies all the year round, the 5.10 p.m. from St. Enoch (Pullman Restaurant Car) to Girvan, due at Stranraer Town at 8.30 p.m. As the steamer does not leave until next morning, but rather too early to render a stay at one of the various hotels in Stranraer altogether convenient, passengers can book state rooms, as far as accommodation permits, at almost nominal charges and spend the night on the steamer. The return summer service leaves Stranraer Harbour at 12.25 p.m. (restaurant car to Ayr), due in Glasgow at 3.30 p.m., while passengers by the 6.25 p.m. service from Belfast leave Stranraer Harbour at 9.27 p.m. and reach Glasgow just after midnight.

While the night services, which apply all the year round, are run primarily for the benefit of through passengers, the summer day services are useful, in that they meet the needs of tourists visiting Galloway and provide very convenient facilities for the various centres, apart from the boat connections. The additional summer steamer services further provide for interesting trips across, also conveying a big excursion traffic, while they are included in a number of special tourist and excursion facilities in operation during the holiday periods.

So far as ordinary trains are concerned, the principal services leave Dumfries (with various connections there and via Carlisle) at 8.30 a.m., 2.35 and 7.37 p.m. The 8.30 a.m. and 7.37 p.m. are fast to Dalbeattie, owing to the fact that they are preceded or followed by Dumfries–Kirkcudbright trains (6.30, 9 a.m., 5.17 and 7.45 p.m.), but otherwise call at all stations. In the opposite direction, the chief services are the 7.40 and 9.30 a.m., and 3.40 p.m. from Stranraer Town. There are also through trains between Kirkcudbright and Dumfries at 6.30 and 8.45 a.m., and at 4.40 and 7.15 p.m. In addition, there are trips on the Kirkcudbright branch in connection with certain of the through trains. The Whithorn branch has five or six trains, some varied according to the day of the week, in connection with main-line trains, while one or two locals between Stranraer and Newton Stewart complete a reasonable provision of train facilities. Portpatrick is served by six or seven trains running locally to and from Stranraer. The last up, the 8.35 p.m. from Portpatrick is continued to Stranraer Harbour (involving reversal) to connect with the through train to Carlisle and Glasgow, while in summer the train at 12.30 p.m. (Wednesdays and Saturdays) starts from Stranraer Harbour, as does the 6.40 a.m. every morning all the year round after the arrival of the through train at the Harbour station. On the Glasgow route, there are trains to Stranraer Town due at 9.45 a.m. and 12.13, 3.38 and 8.30 p.m.,

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and departures at 6.30 and 11.28 a.m. and at 4.8 p.m., in addition to the special boat trains to and from the Harbour.

Various classes of Glasgow and South Western engines work most of the traffic on the Portpatrick and Wigtownshire line, though almost universally of 4-4-0 designs, with some of the big 0-6-0 engines on the goods trains. Glasgow and South Western coaches, too, are usually employed except for the boat trains, which consist mainly of West Coast sleeping cars and vehicles, the L.N.E.R. through coaches to and from Newcastle, and a Caledonian section vehicle for the through service leaving Whithorn at 9.25 a.m. for Edinburgh (Princes Street), returning on the 10.10 a.m., due at Whithorn at 5.41 p.m. This travels via Dumfries and Lockerbie and the Caledonian main line.

In conclusion, the writer would express his indebtedness to Mr. McCleary, station master at Stranraer Town, Mr. J. H. Smith, station master and harbour master at Stranraer Harbour, and to Mr. W. Crozier, Divisional Passenger Commercial Superintendent, Northern Division, Glasgow, and other officers of the L.M.S.R., for assistance rendered in various ways and for much interesting information utilised in the preparation of this article.

SOUTHERN RAILWAY LOCOMOTIVE FITTED WITH SMOKE DEFLECTORS.

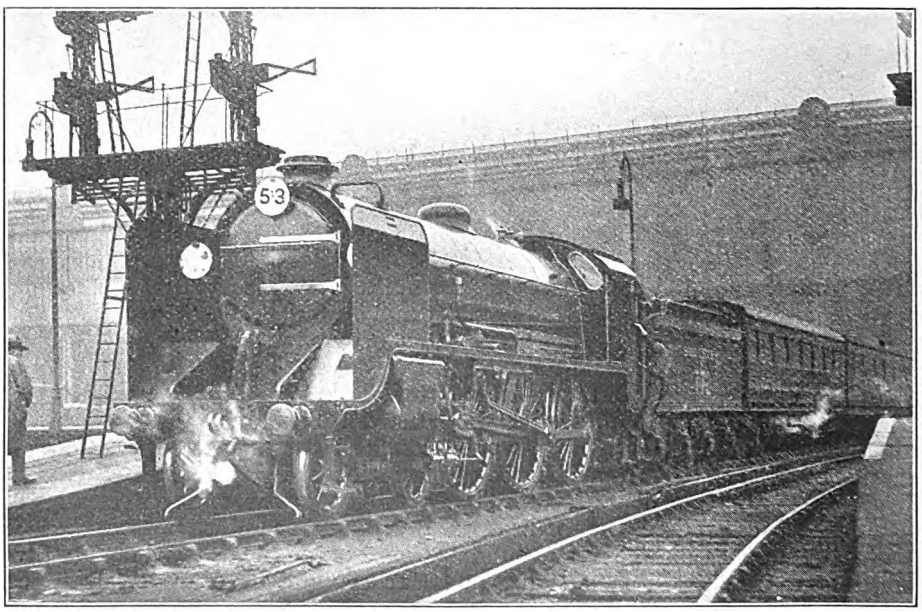

Photo.] [*F. R. Hebron.*

4–6–0 LOCOMOTIVE NO. 772, FITTED WITH SMOKE DEFLECTORS TO SMOKEBOX.

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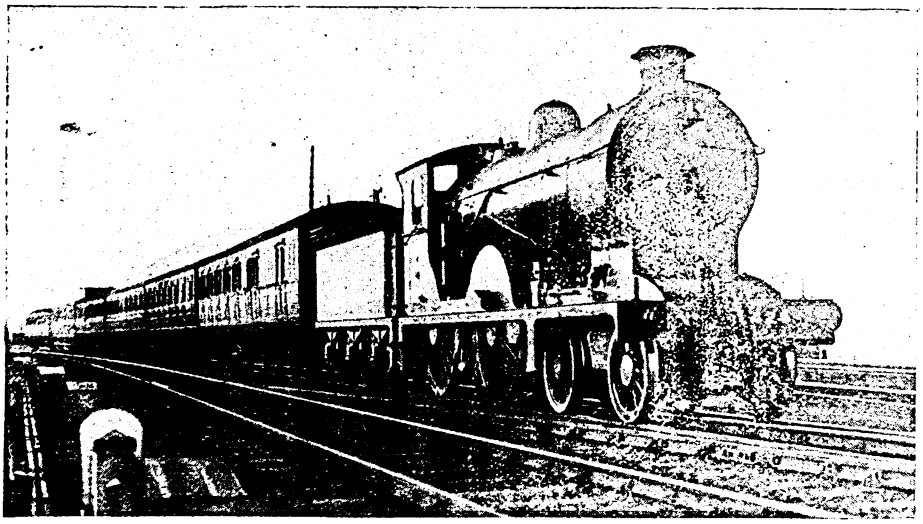

Photo.] [*P. Ransome-Wallis.*

HYNDLAND—BATHGATE—EDINBURGH TRAIN NEAR BATHGATE JUNCTION.
N.B. 4-4-0 No. 9424, *Lady Rowena.*

Edinburgh and Glasgow Routes of the L.N.E.R. (I).

By J. FRANCIS.

IT is only to be expected that the great main routes which carry heavy train services, and over which high-speed express train services are operated, should attract most interest. Moreover, it is over these that most travellers from other districts pass, so that intimate acquaintance with local and subsidiary lines is largely confined to residents in the district and those who have occasion to do business therein, with an occasional visit of inspection by some one who, like the writer and many other readers of THE RAILWAY MAGAZINE, finds much of interest in such lines, including the "obtrusively industrial" as well as the scenic and picturesque.

From this point of view, the tremendously complex system of railways connected with the main routes between Edinburgh and Glasgow have long aroused the writer's curiosity, increased rather than diminished by attempts to follow out the often intricate train services operated by both of the great railway companies which now meet the rail needs of Scotland between them. In this connection, one outstanding feature is that, whether direct train services are operated or not, and disregarding the possibilities of completing through journeys without undue loss of time and need for frequent changing, so many of these lines constitute or can be considered as portions of alternative routes between Edinburgh and Glasgow. This applies in some measure to the late Caledonian lines of the London Midland and Scottish Railway, but is particularly notable in the case of the London and North Eastern (late North British) Railway. This company does, indeed, operate through trains between Edinburgh and Glasgow via Bathgate and Coatbridge, as well as via Linlithgow and Polmont, and some of these provide quite practicable services for through passengers, in that some of the semi-fast trains can be advantageously used at times when a good direct service is not available, even although their main

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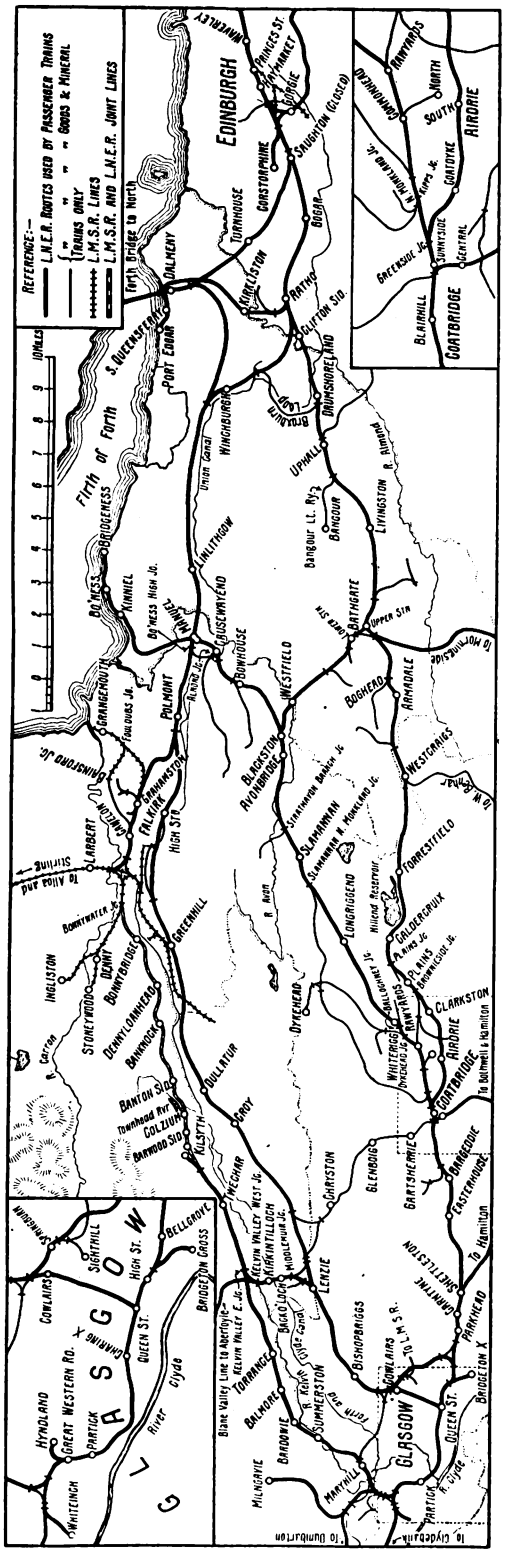
REFERENCE:-
L.N.E.R. ROUTES USED BY PASSENGER TRAINS
" " " GOODS & MINERAL
" TRAINS ONLY
L.M.S.R. LINES
L.M.S.R. AND L.N.E.R. JOINT LINES
Forth Bridge to North
EDINBURGH
WAVERLEY
PRINCES ST.
HAYMARKET
GORGIE
SLATEFORD (CLOSED)
CORSTORPHINE
TORPHOUSE
GOGARBURN
DALMENY
PORT EDGAR
S. QUEENSFERRY
Firth of Forth
RATHO
CLIFTON SID.
KIRKLISTON
BROXBURN
UPHALL
WINCHBURGH
Union Canal
BROXBURN LOOP
BROXBURN
LIVINGSTON & ADDIEWELL
LIVINGSTON
BANGOUR LT. RWY.
BANGOUR
LINLITHGOW
BO'NESS
BO'NESS HIGH JO.
KINNEIL
GRANGEMOUTH
FOULDUBS JN.
POLMONT
GRAHAMSTON
FALKIRK
HIGH ST.
LARBERT
STIRLING
To Alloa and
GRANGE JN.
CAUSEWAYEND
BONNYBRIDGE
WESTFIELD
BATHGATE
UPPER SDG.
LOWER SDG.
To HOLYTOWN
BOGHEAD
ARMADALE
WESTCRAIGS
BLACKSTON
AVONBRIDGE
STRATHAVEN BRANCH JN.
SLAMANNAN & HANKLAND JC.
SLAMANNAN
TORRANCESTFIELD
LONGRIGGEND
Hillend Reservoir
CALDERCRUIX
R. KIRK JC.
R. KIRK
BANKNOCKIE JC.
CLARKSTON
DYKEHEAD
WHITRIGG
AIRDRIE
COATBRIDGE
To Motherwell & Hamilton
BANKNOCKS
STONEYWOOD
DENNYLOANHEAD
BONNYBRIDGE
GREENHILL
INGLISTON
Carron
BANTON SIDG.
Townhead Ayr
COLZIUM
BANWOOD SIDG.
KILSYTH
SORBY
CROY
WESTER
CARBISTON
BLENDOCH
BARTSHERRIE
BARKEDDIE
EASTERHOUSE
To Hamilton
SHETTLESTON
CAMLACHIE
PARKHEAD
BRIDGETON X
GLASGOW
QUEEN ST.
PARTICK
R. Clyde
To Clydebank
To Dumbarton
MARYHILL
MILNGAVIE
BARDOWIE
BALMORE
TORRANCE
SUMMERSTON
BISHOPBRIGGS
LENZIE
KIRKINTILLOCH
KELVIN VALLEY WEST JC.
KELVIN VALLEY E. JC.
Blane Valley Line to Aberfoyle
BRIDGEND GRDSS
BELLGROVE
SIGHTHILL
CONLAWS
WINDSOR PK.
HIGH ST.
QUEEN ST.
CHARING X
GREAT WESTERN RD.
PARTICK
HYNDLAND
WHITEINCH
Clyde
River
Forth & Clyde Canal
Kelvin R.
R. Kelvin
Monkland Canal
Monkland & Kirkintilloch R.
R. Avon
Avon Water
R. Almond
Bangour Village
Livingston Station
Kirkton
Ratho Station
Ratho Park
Dalmeny Park
Dalmeny Station
Cramond
Cramond Brig
Granton
Trinity
Leith
Portobello
Joppa
Musselburgh
Fisherrow
Prestonpans
Cockenzie
Port Seton
Longniddry
Aberlady
Gullane
North Berwick
Dirleton
Drem
Haddington
Gifford
Garvald
Longformacus
Duns
Reston
Grantshouse
Berwick-on-Tweed
Tweedmouth
Spittal
Scremerston
Beal
Lindisfarne
Holy Island
Belford
Bamburgh
Seahouses
Chathill
Christon Bank
Alnmouth
Alnwick
Warkworth
Amble
Coquet Island
Newbiggin
Cresswell
Ashington
Bedlington
Morpeth
Longhirst
Widdrington
Acklington
Guide Post
Felton
Rothbury
Scots Gap
Ponteland
Darras Hall
Ponteland Road
Newcastle
Gosforth
Benton
Forest Hall
Killingworth
Backworth
Monkseaton
Whitley Bay
Cullercoats
Tynemouth
North Shields
Percy Main
Howdon
Wallsend
Willington Quay
Hebburn
Jarrow
South Shields
Tyne Dock
Boldon
Sunderland
Seaham
Hartlepool
Seaton Carew
Middlesbrough
Redcar
Saltburn
Whitby
Scarborough
Filey
Bridlington
Hornsea
Withernsea
Hull
Beverley
Driffield
Market Weighton
Selby
York
Thirsk
Northallerton
Darlington
Stockton
Ferryhill
Durham
Chester-le-Street
Pelaw
Gateshead
Blaydon
Hexham
Riccarton Junction
Carlisle
Silloth
Maryport
Workington
Whitehaven
Ravenglass
Barrow
Ulverston
Grange-over-Sands
Arnside
Carnforth
Lancaster
Morecambe
Heysham
Preston
Blackpool
Fleetwood
Southport
Liverpool
Manchester
Sheffield
Leeds
Bradford
Halifax
Huddersfield
Wakefield
Doncaster
Retford
Lincoln
Grantham
Peterborough
Ely
Cambridge
Norwich
Yarmouth
Lowestoft
Ipswich
Colchester
Harwich
Clacton
Southend
Tilbury
Gravesend
Dartford
Woolwich
Deptford
London
Kings Cross
Liverpool St.
Fenchurch St.
Victoria
Waterloo
Charing Cross
Cannon St.
Blackfriars
Ludgate Hill
Holborn Viaduct
St. Pancras
Euston
Paddington
Marylebone
Baker St.
Willesden
Kensington
Clapham
Wimbledon
Croydon
Brighton
Portsmouth
Southampton
Bournemouth
Weymouth
Plymouth
Penzance
Exeter
Taunton
Bristol
Cardiff
Swansea
Newport
Gloucester
Hereford
Shrewsbury
Chester
Crewe
Stafford
Wolverhampton
Birmingham
Coventry
Rugby
Leicester
Nottingham
Derby
Burton
Uttoxeter
Stoke
Macclesfield
Stockport
Manchester
Wigan
Warrington
Runcorn
Birkenhead
Bangor
Holyhead
Aberystwyth
Pwllheli
Barmouth
Dolgelly
Machynlleth
Aberystwyth
Carmarthen
Fishguard
Milford Haven
Pembroke
Tenby
Llanelly
Swansea
Neath
Port Talbot
Bridgend
Cardiff
Barry
Penarth
Weston-super-Mare
Clevedon
Portishead
Avonmouth
Severn Tunnel
Chepstow
Monmouth
Abergavenny
Merthyr
Aberdare
Pontypridd
Rhondda
Treherbert
Barry
Penarth
Cardiff
Newport
Pontypool
Abergavenny
Hereford
Leominster
Shrewsbury
Wellington
Oswestry
Whitchurch
Crewe
Nantwich
Sandbach
Middlewich
Northwich
Runcorn
Warrington
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Bolton
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Nottingham

n the Edinburgh Suburban and Southside unction (or Circle) Railway, the connection by which L.M.S. trains from Princes treet station reach the L.N.E.R. Glasgow ain line, and the junction for the Corstorhine branch, as far as Saughton. This tation, originally known as Corstorphine, as for some years been closed, and the latforms are, more or less, derelict. Here, he northern pair of lines, to which northound traffic is mainly confined, diverge owards Dalmeny and the Forth Bridge, while the southern pair, which take nearly ll west-bound traffic, continue onwards ast Gogar to Ratho. Just before reaching his station a branch diverges to Kirkliston nd round to Dalmeny that way. This as, in fact, the first route to South ueensferry, for the ferry passage of the irth of Forth from that port, and through junction with the present north main ine, enables trains via Kirkliston to run ither to the main line station at Dalmeny r down and round to South Queensferry. ranch trains have a low level station at atho.

Just beyond Ratho station, we leave he main line at Bathgate Junction, and, assing Clifton Siding and crossing the nion Canal, reach Drumshoreland. The roxburn Railway, a colliery and industrial branch, which loops round to join the irect Glasgow main line, leaves on the ight, just beyond the station, while waste eaps and colliery premises, and mineral idings here and there, alternate with retty undulating country past Uphall nd Livingston until Bathgate is reached. here are an engine shed and extensive idings here, as we are now well into the oal area of Linlithgow county.

Bathgate (Upper) station has the usual wo platforms, on a fairly sharp curve. Just beyond is a triangular junction with the Blackston branch. There is another Bathgate station on the branch, known as Bathgate (Lower), of which more anon. There is also a branch to the south-west leading to the Morningside area. The Edinburgh route continues on past Armadale to Westcraigs, in a district characterised by colliery waste heaps, pit head gear, high chimneys, and intervening patches of moorland or agricultural land, and occasional sidings, so that it is not exactly a tourist route, though industrially it is quite interesting. At Westcraigs, a branch is put off to the south, connecting with a busy series of mineral lines which also reach eventually to the Morningside area.

Fairly open country, partly of moorland character, extends past Forrestfield, beyond which the line runs alongside, in places almost at the water's edge, Hillend reservoir, which is very like a characteristic Scottish loch. At Caldercruix industrialism again evidences itself, and onwards to Airdrie, past Plains and Browniesde Junction, mineral branches are numerous, while we have now reached an area which includes L.M.S. as well as L.N.E. lines.

Airdrie (South) station is the terminus for many local passenger trains, in that the remainder of the route through Coatbridge serves a series of industrial and colliery townships. Airdrie, Coatdyke and Sunnyside station at Coatbridge (though the impression conveyed is that this part of Coatbridge is anything but sunny) almost join on one to the other. Beyond Sunnyside station, only just avoiding it in fact, is the branch to Coatbridge (Central), Bothwell and Hamilton and goods lines and sidings extend nearly all the way to Blairhill and Gartsherrie. This is a rather neat little station, in cutting, and is used as a terminus or starting station for certain train services. These use a branch, which diverges west of the station, for reversing purposes.

Further broken country, alternately industrial and open, with an occasional picturesque bit, but nearly always with colliery waste heaps and factory chimneys in view, and frequently with sidings alongside, characterises the route past Bargeddie and Easterhouse.

From Shettleston, past Carntyne and Parkhead to Bellgrove, however, industrialism reigns supreme, while the layout and the railway connections are far too complex to describe in this article, or without the aid of a large-scale local map. Beyond Bellgrove, the line to Bridgeton Cross terminus is first crossed and then joined on the opposite side, and with glimpses of the busy precincts of College and High Street goods depôts and yards, a descent is made to High Street station and the eastern tunnel approach to Queen Street Low Level station. Here

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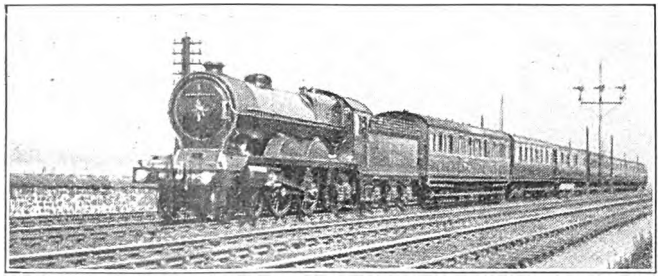
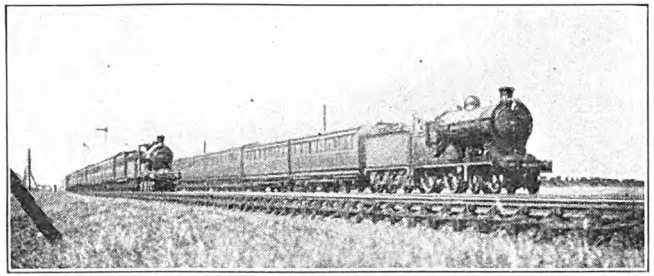
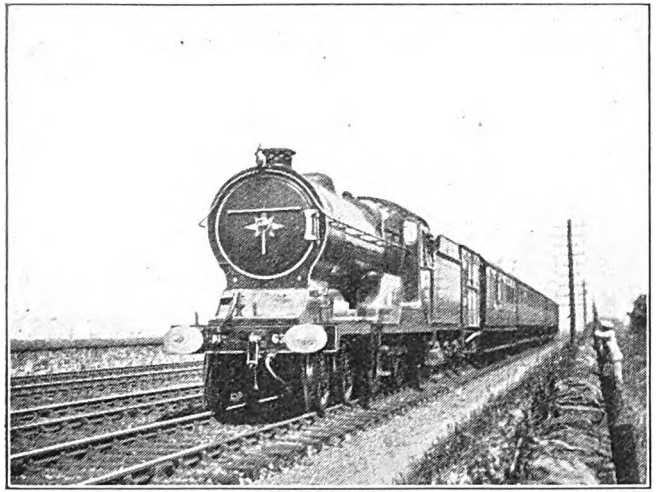


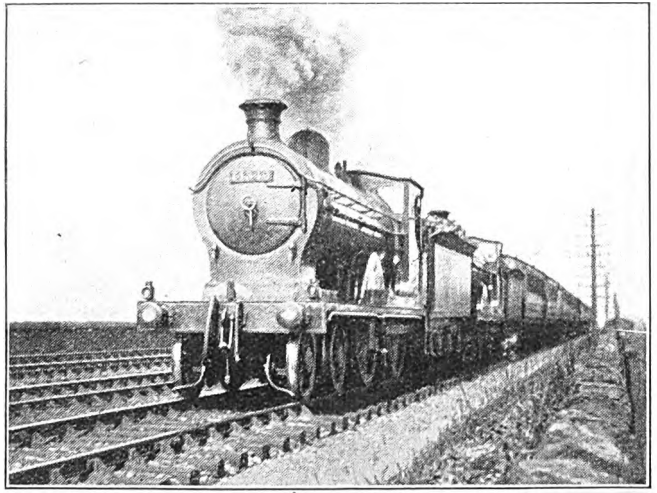
L.N.E.R. EDINBURGH–PERTH EXPRESS.
4-4-2 Locomotive No. 9901, *St. Johnstoun.*



L.M.S. STIRLING–EDINBURGH (LEFT) AND L.N.E. PERTH–EDINBURGH (RIGHT) TRAINS.



Photos.]
L.N.E.R. EDINBURGH AND GLASGOW EXPRESS.
4-4-0 No. 6381, *Flora McIvor.*



[*C. J. L. Romanes.*
L.M.S. EDINBURGH-OBAN TRAIN.
4-4-0's Nos. 14349 and 14352.

VIEWS NEAR SAUGHTON, L.N.E.R., EDINBURGH AND GLASGOW MAIN LINE.

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each of the running lines has a loop, so that there are four lines, a central island platform and two outer platforms. All trains work through, but the duplication of the east-bound and westbound lines enables one train to wait up to 8, 10 or 12 minutes, while one or more in the same direction pass, before continuing. The usual terminus of trains from Edinburgh is Hyndland, to the west of Glasgow, but there is no rigid rule and trains of a more local character appear to be scheduled to work between various places and over all kinds of strange routes.

In this connection it will be of interest to consider some of the trains on the Edinburgh-Bathgate route in detail, using the services in operation last summer, as they introduced some special items not found in the winter time-tables, though, in the main, the route is an all-the-year-round one, not greatly affected by tourist facilities and requirements. There are, first, four trains starting from Airdrie (South) at 5.15, 6.8, 7.9 and 7.50 a.m., stopping at all, or nearly all, stations. Three of these work through to Hyndland for terminal purposes, but the 7.9 goes instead to Clydebank. Next is the 7.41 a.m. from Bathgate, non-stop from Blairhill to High Street. This, apparently, terminates at Queen Street (L.L.), but actually serves Charing Cross and Partick, thence empty to Hyndland. This is followed by the 8.16 a.m. from Caldercruix to Hyndland, and the 9.6 a.m. from Coatbridge (Sunnyside) to Clydebank. The first Edinburgh train is the 7.55 a.m. calling at nearly all stations to Hyndland, due 10.4 a.m. The 8.42 a.m. from Waverley is a fairly good semi-fast, through to Hyndland, running on Wednesdays and Saturdays only. The 10.39 a.m. from Caldercruix is followed by a very fair semi-fast train from Waverley at 10.35 a.m., due Queen Street (L.L.) at 12.4 p.m. On Saturdays this is continued right through to Helensburgh, so that it gives a through service to Craigendoran (for the Clyde steamers), though on other days it terminates at Hyndland.

The 11.32 a.m. from Bathgate to Hyndland, a local at 12.25 p.m. on Saturdays from Caldercruix to Coatbridge, the 1.5 p.m. Airdrie to Clydebank, and the 1.20 p.m. from Blairhill to Hyndland, lead up to the most remarkable train of the day on this route (summer only)—the Saturday express from Waverley at 12.50 p.m., non-stop from Haymarket, at 12.53, to Queen Street (L.L.), 2.7–2.14, 72 mins. for 43 miles. This may not seem a very startling time, but the route is heavily graded and speed restrictions are imposed at many points, while the real value of the train is that it is extended to Craigendoran and Helensburgh, and therefore caters mainly for steamer passengers who would otherwise have to change at Queen Street.

The 1.39 p.m. from Bathgate (other days from Airdrie at 2.15 p.m.), the 1.43 p.m. stopping train from Waverley, and the Saturday 2.52 p.m. from Coatbridge work through to Hyndland, while the 3.51 p.m. from Caldercruix goes to Milngavie, and the 4.49 p.m. from Westcraigs to Clydebank. The 4.36 from Waverley is semi-fast to Hyndland, while the 6.12 p.m. from Shettleston (practically a one-station train as it is non-stop thence to Queen Street) goes to Milngavie. The remainder of the service consists of the 5.29 and 8.55 p.m. from Bathgate, the 7.16 p.m. from Caldercruix, and the 6.45 p.m. from Edinburgh, which all go to Hyndland, the 6.54 p.m. from Airdrie, and the 9.30 p.m. semi-express from Waverley, which go to Milngavie, and the 8.21 p.m. from Airdrie which terminates at Whiteinch, with the 8.38 p.m. from Waverley to Bathgate and the 10.40 p.m. Waverley to Westcraigs, both Saturdays only.

These particulars indicate that the working of these trains introduce several features of interest, while detailed examination will show that the route in question is quite a busy one between Airdrie and Glasgow, and that the eastern sections are not badly served. In the opposite direction there are similar through workings from Hyndland, Milngavie, &c., and several interesting examples of semi-fast working. The "practicable express" trains through to Edinburgh are the 8.5, 10.15 and 11.42 a.m., (Wednesdays and Saturdays only) and the 3.26 and 7.57 p.m. from Queen Street (L.L.), with several other stopping or moderately semi-fast trains. Others terminate at Bathgate, Westcraigs, Caldercruix, Airdrie (South) and Coatbridge (Sunnyside). Mention may also be made of the 11.52 a.m.

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on Saturdays from Blairhill to Caldercruix; the 4.58 p.m. express to Coatbridge and Airdrie, where on Saturdays it terminates instead of continuing on to Westcraigs, Armadale and Bathgate; and the 8.10 p.m. (Saturdays only) which travels from Coatbridge to Bathgate via Commonhead and Blackston and terminates at Uphall, only five stations short of Edinburgh.

Before going further north, attention may be given to the somewhat mysterious though interesting group of lines between the Coatbridge & Bathgate section of the Bathgate route and the Edinburgh & Glasgow main line. There is quite an intricate system of these, but only certain sections are used by passenger trains while all are mainly concerned with colliery and industrial traffic. Incidentally, they include some of the oldest railways in Scotland, some originally and for many years worked by horses, locomotive haulage being a later development.

Three of the early railways thus concerned were amalgamated with the old Edinburgh & Glasgow Railway by Act of July 5, 1865, prior to the greater amalgamation of July 31, in the same year, which associated the original North British, Edinburgh & Glasgow, Edinburgh, Perth & Dundee, &c., to form the basis of the modern North British system. One of these old lines was the Monkland & Kirkintilloch, authorised in 1824 and opened in 1826. This line commenced in the neighbourhood east of Coatbridge, at what is now known as Kipps Junction, passing through Coatbridge, Gartsherrie and Glenboig, generally north-westerly to Chryston. Thence there are curves in both directions to the Edinburgh & Glasgow main line, but the old route passes under and terminates with a branch to a basin or wharf on the Forth & Clyde Canal near Kirkintilloch. The route is one continuous succession of colliery, sand quarry, brickworks and other sidings.

BLACKSTON JUNCTION.

The Ballochney Railway, also dating from 1826, joined the Monkland & Kirkintilloch at Kipps and extended up the Ballochney or Commonhead incline to Ballochney Junction just short of Whiterigg station. There it merged into the Slamannan Railway (1835), which terminated at the town of Slamannan. These three lines were amalgamated in 1848 to form the Monkland Railway, and that company added the extension to Blackston the line thence to join the Edinburgh & Glasgow Railway at Bo'ness High Junction, thus connecting with the Bo'ness Harbour branch; and the route from Blackston to Bathgate. The Monkland obtained connection with the Firth of

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Forth at Bo'ness, with the Forth & Clyde Canal at Kirkintilloch, and with the Bathgate "mineral field," as well as the Coatbridge area and the districts served by its various sections. Meanwhile, the route from Glasgow had been extended through Airdrie to Clarkston, and in stages to Bogside (beyond Armadale) and thus to Bathgate in that direction. There was also the branch from Kipps to the Bathgate line at Browniesside Junction, besides several other sections, such as the Plains branch and one or two other of the various lines in this area; also the line down to Hartwoodhill and Shotts, south of Westcraigs.

The Monkland Railway was absorbed in the Edinburgh & Glasgow, and then in the North British Railway, in 1865, as already mentioned, but there were still further stages constructed by separate companies. Thus, the North Monkland dates from 1877, and consisted of the line which curves north-westerly and north-easterly from the North Monkland Junction on the Commonhead branch at Kipps and rejoins about three-quarters of a mile before Slamannan is reached. The Dykehead branch was constructed about this time. In fact, its promotion caused the North Monkland scheme to be altered in some respects. This branch leaves the Commonhead line at Dykehead Junction, beyond Rawyards, and joining and crossing the North Monkland line, terminates at Dykehead to serve several collieries.

These lines, with a few sections not specifically mentioned, complete the Monkland group of lines, all severely industrial, many used only by goods and mineral trains, and in the midst of a host of collieries, quarries, &c. The general characteristics, which include very steep gradients in places, easily understandable in the case of lines promoted for small-scale horse haulage, will be gathered from the following notes made in journeying from Coatbridge to Blackston, and thence to Bathgate and Manuel.

Trains from Coatbridge usually start from Blairhill, in connection with trains from Glasgow, and after calling at Sunnyside, leave the Airdrie line at Greenside Junction, another name quite inappropriate now, whatever may have been the case in early days. A short distance beyond are the Kipps engine sheds, which supply engine power for the district. At North Monkland Junction a stop is made, except with the lightest of trains, for a banking engine, as the single line includes 440 yards at 1 in 23, 1 in 25¾ for 380 yards, 1 in 27 for 550 yards, and 1 in 31 for 650 yards, thus including one of the two steepest inclines worked by adhesion locomotives anywhere in the British Isles.

A stop is made at Commonhead station (one platform), as it also serves part of Airdrie, hence its alternative name of Airdrie (North), but as the top of the incline has not been reached, the unusual experience is had of a station stop by a train with engines at each end. Passing the goods branch to Airdrie North, another half-mile brings us to Rawyards. Here the banking engine gives a push-up and then leaves us, while double-track recommences as we continue to Whiterigg station, passing Dykehead and Ballochney Junctions. A little further on single line is resumed, and passing five colliery sidings we reach Longriggend station. The country traversed is here of a moorland or bog character, peat being, indeed, one of the local products, as can be seen by the evidences of peat stacks here and there. Further colliery sidings occur in close sequence, and, after passing North Monkland Junction the station which serves the town of Slamannan is reached.

Still more colliery sidings, and connection with the Strathavon Colliery branch, but the country becomes a little more interesting. It is, indeed, quite pretty in places, particularly where it joins company with the River Avon, which gives its name to the next station, Avonbridge. Another 51 chains (now double track) and Blackston Junction is reached. This, though the junction is immediately at the station, has only one platform, though trains can be crossed or make connections by utilising the goods line. Just beyond the station the Bathgate line turns to the right, single line, while the Manuel line serves a group of collieries before it also becomes single. Otherwise, the latter is fairly straightforward, until Bowhouse station is reached. Connection is then made with a branch serving Muiravonside and Roughrigg collieries, and at Causewayend Incline

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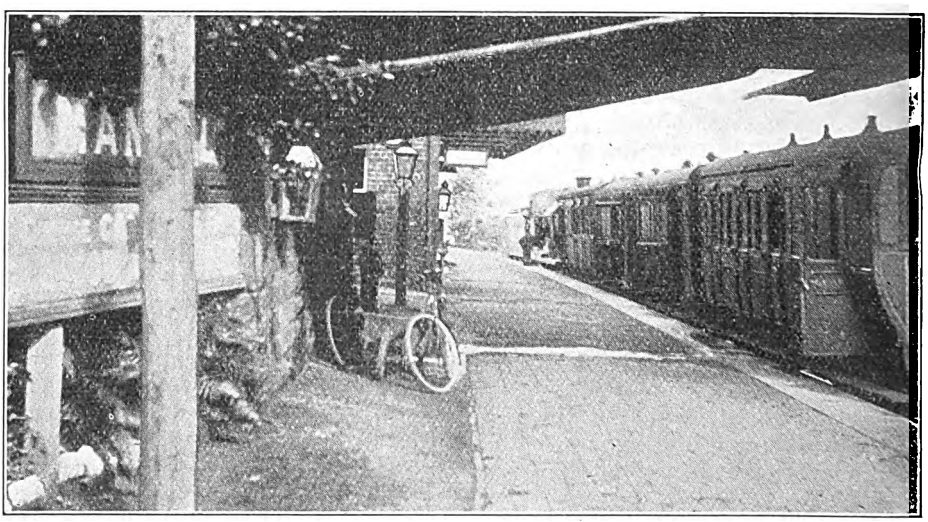
top box, where there is a crossing loop, our train descends the second 1 to 23 incline in this area, indeed in the whole of the British Isles, so far as passenger adhesion-operated lines are concerned.

This incline includes 860 yards at 1 in 23, and, needless to say, is extremely carefully descended, while the ascent requires assistance if any substantial weight is to be operated. At the foot there is another crossing loop, train staffs being also exchanged, though it is only a short run to Causewayend station. At the crossing loop a branch is put off, which, at Blackbraes (Almond) Junction, divides, one branch serving a series of collieries, while immediately under, but at right angles to, the main line. It has a dock platform and a through platform, with inclines to the up and down platforms in the station above. A little beyond the station there is a crossing loop adjacent to the junction curve from the main line. The rest of the route to Bo'ness must, however, be left for consideration later, and a return made to Blackston Junction.

Towards Bathgate the route traversed is, for some distance, very pretty indeed, particularly where the river Avon is crossed by a fairly high viaduct, and looking towards the Westfield paper mills on



LOW LEVEL STATION AT MANUEL.

the other (the original line) curves round to join the Edinburgh and Glasgow main line west of Manuel station, in a position also to reach the main line route towards Bo'ness. From the passing loop, however, trains from Blackston, most of which go on to Bo'ness, continue past Causewayend station (one platform and no sidings), having crossed the Union Canal among surroundings which are distinctly picturesque. The Almond Valley Viaduct, on the "Bo'ness High" route, is an outstanding feature.

From Causewayend a rather attractive run of about a mile, including a viaduct over a stream and valley, brings us to Manuel Low Level station. This is the river bank. Still in interesting country, connection is made with colliery lines and then with a branch to the Westfield paper mills, and, after another colliery line, there is a clear run of over a mile to Bathgate (Lower) station. Here the surroundings are again those of an industrial and largely colliery town, good view of which is had as the train rounds the curve to Bathgate (Lower) station, after passing the west-bound curve which completes the triangular connection.

The passenger train services on the lines thus considered are comparatively sparse, though no doubt sufficient for requirements, but they introduce some interesting

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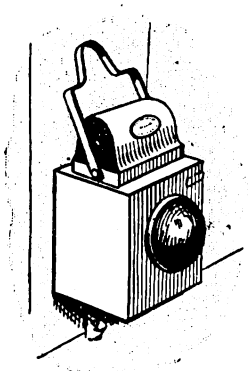
features. Indeed, it requires, to some extent, following out the duties of certain trains. The 6.11 a.m. from Blairhill reaches Blackston at 7.4 a.m., and continues immediately round to Bathgate, whence another train has come, leaving at 6.42 a.m., reaching Blackston at 6.55 a.m., leaving again, after reversal, at 7.10 a.m. for Manuel, due 7.26, thus giving connecting services on both routes from Blackston. Returning at 7.50 a.m. from Manuel (Low Level), Blackston is reached at 8.6 a.m. to connect with the 8.3 a.m. from Bathgate, which continues to Coatbridge, via Commonhead, and onwards not only to Glasgow (Queen Street L.L.), but also to Clydebank, while the Manuel train reverses to form the 8.24 a.m. from Blackston to Bathgate.

The next service is the 9.55 a.m. from Blairhill, which leaves its Manuel passengers at Blackston from 10.38 a.m. until 11.14 a.m., while it goes to Bathgate, due 10.53 a.m. At 10.55 a.m., another train leaves Bathgate for Blackston, and, after reversal, forms the 11.14 a.m. for Manuel, in this case continuing through to Bo'ness. The 11.23 a.m. from Bathgate to Coatbridge (empty to Blairhill) has no Manuel connection, and the next train of interest is the 1.8 p.m. from Manuel (12.40 from Bo'ness), and this works through to Blairhill, giving no Bathgate connection. The 2.28 p.m. from Blairhill works through not only to Manuel, but also to Bo'ness, and has no direct connection to Bathgate, though on Saturdays it is served by the 2.52 p.m. from Bathgate (which waits at Blackston from 3.4 until 3.16 p.m.) for Coatbridge and through to Glasgow and Hyndland. Then at 4.19 p.m. a train leaves Bathgate for Blackston to Avonbridge, whence it returns at 4.53 p.m., so that local purposes only are met. Similarly, the 4.49 p.m. from Blairhill (4.8 p.m. from Hyndland) finishes at Blackston at 5.40 p.m., but is followed from Slamannan by the 5.40 p.m. for Bathgate. This latter is the return working of the 4.28 from Manuel (3.58 from Bo'ness) to Slamannan.

The remainder of the service consists of the 7.4 p.m. from Bathgate to Avonbridge, returning at 7.42 p.m., and the 7.36 p.m. from Blackston to Blairhill (Coatbridge on Saturdays), together with the 8.41 p.m. (8 p.m. from Hyndland) on Saturdays only to Bathgate, continuing to Uphall, as mentioned in connexion with the direct Edinburgh–Glasgow route via Bathgate, and the 9 p.m., also on Saturdays only, from Bathgate to Avonbridge, then returning empty to Bathgate. Not a great service, but interesting in several respects.

(To be continued.)



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British Locomotive Practice and Performance.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

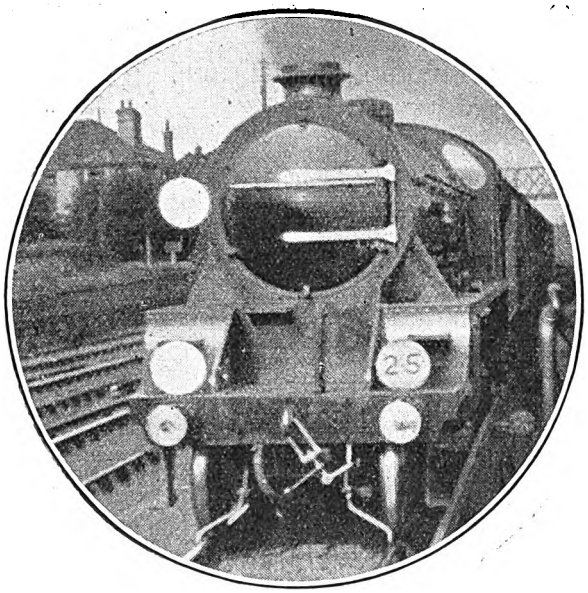

Photo.] [*C. H. B. Burnell.*

3.50 P.M. WATERLOO–PORTSMOUTH EXPRESS.
4-6-0 locomotive No. 781E, *Sir Aglovale.*

As it has now become customary for THE RAILWAY MAGAZINE to see the New Year in from the north side of the Border, it falls to me his month to occupy my space with some escriptions of current locomotive running n the Scottish sections of our great roups. Correspondents have kindly come o my rescue with a number of interesting ecords, as during 1926 my visits to cotland were few and far between. On he last of them, however, I was successful n recording one of the finest feats of cottish running that I have noted for any years past, and with this I will ommence.

The run in question was the sequel to a omewhat tragic journey south of Carlisle, where the 10 a.m. from Euston arrived 6 min. late. From Carlisle the train was divided, and the Glasgow portion, einforced by three more vehicles—of which I was the only occupant—was anded over to the care of Midland 3-cylinder compound No. 1068. The unning that followed is set out in close detail in the table on the next page. To Beattock, though quite good, it was not exceptional. Twice, when we should have been accelerating—at Floriston and before Lockerbie—the driver appeared to bring his regulator back too far, with the result that the speed fell slightly, instead of rising. In the former case, curiously enough, we touched 61 m.p.h. at Floriston, fell to 57½ at the River Esk, and accelerated to 60 up the 1 in 193 to Gretna, afterwards gradually dropping to 49 up the long 1 in 200 which completes the 7½ miles continuously at 193–200 to a point 14½ miles from Carlisle. In assessing the work performed from Carlisle to Beattock, this incline should be borne in mind, as well as the 4¼ miles similarly graded past Ecclefechan to Brackenhill Summit (on which speed fell from 62½ to 52 m.p.h.), and 4 miles yet more up to Beattock station, on which we dropped from 60 to 50 m.p.h. before steam was shut off. After a rapid acceleration from Brackenhill to 64 m.p.h., the speed "dropped," as before, to 60 through Lockerbie, when we should have been doing 70 or so. These were, however, the only features of the running which could be termed in any way disappointing.

From the re-start at Beattock we did magnificently up the famous bank, with the assistance of a bank engine in rear, maintaining speeds of between 37 and 34½ m.p.h. all the way up its 1 in 69–88, and taking 3 min. less from Beattock start to passing Summit than the train is nominally allowed from pass to pass. Then from Summit down to Carstairs we made the fastest run that I have timed over the

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L.M.S. (CALEDONIAN SECTION), CARLISLE—GLASGOW.

Engine: Midland 3-cyl. compound 4-4-0, No. 1068.
Load: 36 axles, 260 tons tare, 270 tons full.

Distance.		Schedule.	Actual.	Speeds.*
miles		min.	m. s.	m.p.h.
0·0	Carlisle.. ..	0	0 00	—
4·1	Rockcliffe ..	—	6 50	55½
6·1	Floriston ..	—	8 55	61
8·6	Gretna.. ..	11	11 30	60
13·0	Kirkpatrick ..	—	16 40	49
16·7	Kirtlebridge ..	21	20 55	62½
20·1	Ecclefechan ..	—	24 25	52
22·7	Castlemilk Box	—	27 15	64
25·8	Lockerbie ..	31	30 20	60
28·7	Nethercleugh ..	—	33 10	62½
31·7	Dinwoodie ..	—	36 15	56½
34·5	Wamphray ..	—	39 20	60
39·7	Beattock ..	48	45 40 47 10	50†
41·8	Auchencastle Box	—	52 25	39½
45·2	Greskine Box ..	—	57 45	38
47·7	Harthope Box..	—	61 45	37½
49·7	Summit ..	69	65 05	36½
52·6	Elvanfoot ..	—	68 15	70½
55·3	Crawford ..	—	70 35	75
57·8	Abington ..	—	72 35	74
63·2	Lamington ..	—	76 50	76½
66·9	Symington ..	86	80 20	61
68·5	Thankerton ..	—	81 50	72½
70·0	Leggatfoot Box	—	83 10	64½
73·2	Strawfrank Jc.	—	86 05	72½‡
73·5	Carstairs ..	94	86 30	55§
			sigs.	40
76·3	Cleghorn ..	97	89 50	—
80·7	Braidwood ..	—	94 55	—
81·9	Carluke.. ..	—	96 10	69
84·1	Law Junction ..	108	98 10	55§
86·4	Wishaw¶ ..	— 116	101 35 102 00 107 45	— —
89·5	Motherwell	117	108 35	—
92·8	Fallside ..	—	113 50	60
93·8	Uddingston ..	124	114 50	64
			sigs.	20
95·7	Newton ..	127	117 40	—
99·2	Rutherglen ..	131	122 40	—
101·3	Eglinton Street	135	125 05	—
102·3	Glasgow ..	139	128 25	—

* Max. and min. speeds, by chronograph.
† Speed on shutting off steam for stop.
‡ Speed on shutting off steam for slack.
§ Service slack. ¶ Signal stop.

Caledonian section for many years. Down to Lamington, speed ranged well above the "seventy" line, save for a brief minimum of 67 after Elvanfoot; the short 1 in 194 rise to Symington did not bring us below 61 m.p.h., nor the similar rise from Thankerton below 64; and maxima of 72½, both at Thankerton and before Strawfrank, preceded the slowing through Carstairs. The 20·6 miles from Elvanfoot to Strawfrank were run in 17 min. 50 sec., at an average of 70·8 m.p.h., and between Beattock and Carstairs alone, 6⅔ min. of lost time were regained. Then came a signal check at Cleghorn, and after a brief maximum of 69 an hour through Carluke and the usual slowing through Law Junction, we got a worse check, bringing us to a dead stand at Wishaw. The 46·7 miles from Beattock over Summit to Wishaw had been covered in 54 min. 25 sec., start-to-stop, or about 53 min. net.

Despite making the conditional stop at Motherwell, and having a very severe signal check through Newton, we completed the run from Carlisle to Glasgow in just under 128½ min., or 10½ min. under schedule. Debiting 6½ min. to signal checks, the driver had some 16 min. to his credit, and without the Motherwell stop, I believe we should have made an unchecked run in the even two hours from Carlisle, or possibly 119 min. We reached Glasgow 67 min. late. With all allowance for the easy character of the schedule, this was indeed a refreshing experience, and the Scottish driver did what he could to recover as much as possible of the time lost south of Carlisle.

Two runs on the 1.30 p.m. up train, timed by a correspondent, figure in the second table. Their chief value lies in the comparison that they afford between the running of a Midland compound and one of the newest 4-6-0 engines of the Caledonian "60" class—one of the very few types of other than Midland design that has been built to run on L.M.S. metals since grouping took place. The latter was much the more heavily loaded of the two, having to take no less than 490 tons, but was provided with pilot assistance from Symington to Summit. The compound, with 340 tons, touched 59½ m.p.h. at Lamington, fell to 48 before Elvanfoot, and then breasted the 2¼ miles at 1 in 99, from the uppermost Clyde bridge up to Summit, with no greater drop in the speed than from 50 to 40 m.p.h.—a notable achievement indeed. After this,

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L.M.S. (CALEDONIAN SECTION), SYMINGTON-CARLISLE.

	Engine No.	..	1139*	14630†
	Load (axles)	..	46	66
	,, (tons tare)	..	320	455
	,, (tons full)	..	340	490
Distance.		Schedule.	Actual.	Actual.
miles		min.	m. s.	m. s.
0·0	Symington	0	0 00	0 00
3·7	Lamington	—	6 16	5 47
9·1	Abington	—	12 17	11 33
11·6	Crawford	—	15 22	14 35
14·3	Elvanfoot	—	18 43	17 58
17·2	Summit	pass	pass	22 21
		23	22 35	23 49
22·7	Greskine Box ..	—	27 29	29 44
27·2	Beattock	34	33 32	35 19
32·4	Wamphray	—	38 52	40 11
35·2	Dinwoodie	—	41 24	42 45
38·2	Nethercleugh ..	—	44 18	45 47
41·1	Lockerbie	48	47 09	48 52
44·2	Castlemilk Box ..	—	50 33	52 30
46·8	Ecclefechan ..	—	53 37	55 33
50·2	Kirtlebridge ..	57	56 58	59 01
53·9	Kirkpatrick ..	—	60 22	62 37
58·3	Gretna	65	64 06	66 39
60·8	Floriston	—	66 15	68 59
62·8	Rockcliffe	—	68 02	71 03
64·8	Kingmoor Box ..	—	70 03	73 18
66·9	Carlisle	76	73 00	76 42

* Midland 3-cyl. compound 4-4-0.

† New 2-cyl. 4-6-0, "60" class, piloted to summit by non-superheated "Dunalastair IV" class 4-4-0, No. 14630.

all was plain sailing; the bank was descended at an average rate of less than 60 m.p.h., followed by a speed of 63–64 m.p.h. from Wamphray to Nethercleugh, a minimum of 49 at Brackenhill, 65 at Kirtlebridge, and a sustained rate of 73 past Gretna. With a fast finish, this gave a time of 50 min. 25 sec. for the 49·7 miles from Summit, and a gain of 3 min. to engine on the 76 min. allowed.

The 4-6-0, with 4-4-0 pilot, touched 60½ m.p.h. at Lamington, and fell from 48½ to 36½ m.p.h. up the final rise to Summit, ere steam was shut off for the stop. Rather faster running than before ensued to Wamphray, with a maximum of 67 m.p.h.; after that speeds were 57½ m.p.h. at Nethercleugh, 47 at Brackenhill, and from 64 to 67½ m.p.h. from Kirkpatrick down to Floriston. There was a loss of 42 sec. on schedule, but, in view of the magnitude of the load, this was not discreditable.

Before leaving the Caledonian section, I may mention a north-bound run on the 10 a.m. out of Buchanan Street. The engine was No. 14448—a McIntosh 4-4-0 superheater—and the train consisted of seven 8-wheelers and three 12-wheelers, 46 axles, 318 tons empty and 340 tons full. Immediately after leaving the station we stopped to attach a bank engine in rear, for the ascent to Robroyston, which is at 1 in 79–98–126 for the first 1⅛, 1, and ⅝ miles respectively. Inclusive of 55 sec. standing, we passed Robroyston, 3·2 miles, in 9 min. 35 sec., at 40 m.p.h. Garnkirk, 6 miles, was passed in 12 min. 55 sec., and Glenboig, 9 miles, in 17 min., speed having gradually risen to 56½ m.p.h. on the level from Robroyston. Cumbernauld, 13·1 miles, was passed in 20 min. 50 sec., with a speed of 57½ m.p.h. beyond Glenboig and a fall to 46½ on the mile up at 1 in 99 to the former station. All the way down to Larbert we ran with such caution as not to touch 60 m.p.h.; Greenhill, 18·6 miles, was passed in 27 min. 10 sec., and Larbert, 22·1 miles, in 31 min. 5 sec. Up the 1½ miles at 1 in 126 from Alloa Junction to Plean we fell from 57 to 44 m.p.h.; Plean, 26·1 miles, was passed in 35¾ min., and Bannockburn, 27·8 miles, in 37 min. 55 sec., at 58½ m.p.h. Speed was reduced as we approached Stirling; we passed the centre of the station, 30·2 miles, very slowly in 41 min. 5 sec. (2 min. early) from Glasgow, and then drew to a stand at Stirling North advanced starter.

The fireman climbed on to the top of the tender, hopefully looking back, it seemed, for a "banker" in rear for Dunblane bank; the guard dropped on to the six-foot and steadfastly regarded the fireman; and there we stood for seven solid minutes with all signals off. Then the driver must have made up his mind that he could tackle the bank after all, so away we started. We had about 1½ miles in which to get a "run" at it; here we attained 46½ m.p.h. The ascent is first for 2½ miles at 1 in 100, then for another 2½ at 78–91; and then for the last ¾-mile at easier grades, mostly about 140. On the steepest part we got down to 21 m.p.h., but recovered to 27 before passing the summit at Kinbuck. From Stirling start

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to Kinbuck, 7·5 miles, took 15 min. 20 sec. We got up to 51 m.p.h. after Greenloaning, but fell to 41 on the rising grades past Blackford, reaching Gleneagles, 47·4 miles from Glasgow, in 78¼ min., instead of the 69 min. allowed. The Stirling stop cost fully 10 minutes, and the relative ease with which the engine ultimately went up the bank made the waste of time the more mystifying. Despite the lateness of the train, a most leisurely descent was made to Perth, speed being kept at the unnecessarily low figure of 52 to 59 m.p.h. right down to Dunning. After that it was allowed to rise to 66, but the 15·8 miles the 30 m.p.h. mark, the absolute minimum being 31 m.p.h., on the 1 in 80, between Dalwhinnie and Drumochter Summit. Dalwhinnie, 13 miles, was passed in 23 min. 23 sec., Drumochter, 18·5 miles, in 33 min. 33 sec., and Dalnaspidal, 20·6 miles, was reached in 36 min. 1 sec., speed having just reached 60 m.p.h. before the stop. After 1½ min. standing, the 4-6-0 covered the 15·7 miles down to Blair Atholl most cautiously in 21 min. 38 sec., start-to-stop, inclusive of a bad p.w.r. check above Struan. Total time from Kingussie to Blair Atholl was thus 59 min. 11 sec. (60 min. allowed), or 57 min. net.

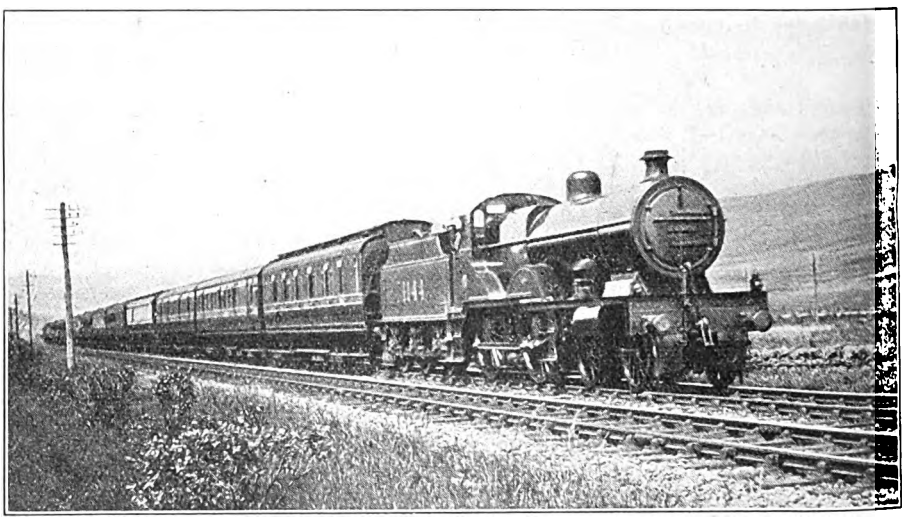

Photo.] [*C. J. L. Romanes.*

GLASGOW-EUSTON EXPRESS NEAR BEATTOCK.
4-4-0 Compound Locomotive No. 1144.

from Gleneagles to Perth took 19¾ min., and we arrived just over 8 min. late.

As regards the Highland Division, I am dependent on the kindness of a correspondent, who sends me details of a journey on the first portion of the 3.45 p.m. Pullman dining-car express from Inverness to the south. The train engine—4-6-0 No. 14678, *Gordon Castle*—was provided with a pilot from Kingussie to Drumochter Summit (No. 14403, *Ben Attow*, of the small "Ben" 4-4-0 type), for a 38-axle train of 285 tons' gross weight. Newtonmore, 2·9 miles, was passed in 5 min. 23 sec., and throughout the climb—mostly at 1 in 100–150—speed kept steadily above

From Blair Atholl to Pitlochry the start-to-stop time for 6·8 miles was 12 min. 43 sec., or 11 min. net (as booked), allowing for another p.w.r. check. From Pitlochry, the usual smart downhill start was made, Moulinearn, 2·7 miles, being passed in 4 min. 25 sec.; thence the speeds were 51 m.p.h. at Ballinluig, 41 at Dalguise, 46½ at Dunkeld, 25½ at Kingswood, 60 at Murthly, 34 (slack) at Stanley, and 56 at Luncarty; while the times were 7 min. 20 sec. to Ballinluig, 4·9 miles, 18 min. 7 sec. to Dunkeld, 12·9 miles, 22 min. 57 sec. to Kingswood, 15·6 miles, 26 min. 13 sec. to Murthly, 18·1 miles, 30 min. 20 sec. to Stanley, 21·2 miles, and—after

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a slight signal check—40 min. 25 sec. into Perth, 28·5 miles. Net time for the last stretch was 39¼ min., against a booking of 41 min., so that the engine had everywhere a little in hand on schedule time.

Before leaving Perth, let me describe the most striking post-grouping assemblage of vehicles that I have ever witnessed in one train. It was the 12.10 p.m. from Perth to Inverness, all vestibuled stock, and this is the order in which it was composed: Midland clerestory composite brake (red), L. & Y. composite (chocolate and brown), new L.M.S. composite brake (red), L.N.W. third class (chocolate and white), Furness composite (blue), new L.M.S. third class (red), West Coast Joint clerestory composite dining-car, with kitchen in centre (red), Midland clerestory first-class dining-car, with kitchen at one end (red), L. & Y. non-corridor third-class brake with flat roof (chocolate and brown—in so far as any paint was still visible), and West Coast Joint brake composite (red). For an effort at railway kaleidoscopy this would take a lot of beating!

I came southward from Perth on the London & North Eastern 12.25 p.m. train, and a vigorous exhibition was put up by North British "Atlantic" No. 9901, *St. Johnstoun*. For no reason immediately apparent, the train was made up to no less than ten eight-wheelers (whereas half this number would have sufficed), weighing empty 281 tons, and full not more than 290 tons. The point of particular interest, of course, was the way in which the engine would tackle Glenfarg bank with this load, with its 6½ miles of practically continuous 1 in 75, but we went up with flying colours, settling down finally to a steady 26 m.p.h. Our total time for the 6¾ miles between mile-posts 44 and 37¼ was 12 min. 50 sec.—an average of 31·6 m.p.h., and, as will be seen, we gained ¾-min. on schedule between Bridge of Earn and Glenfarg. The rest of the journey is so infested with slacks and sharp switchback grades as to give the engine very little chance of earning distinction. We only fell from 30 m.p.h. (a speed reduction) at Kelty to 26½ up the 1 in 80 to Cowdenbeath, and another good piece of work was to fall only from the 40 m.p.h. slack through Inverkeithing to 36 up the 2 miles at 1 in 70 on to the Forth Bridge. It will be seen that the engine had time in hand on every stage, gaining 1½ min. from Perth to Kinross Junction, 1¼ min. thence to Dunfermline, and another 1¼ min. from there to Edinburgh—a total 4 min. on the journey. The table overleaf

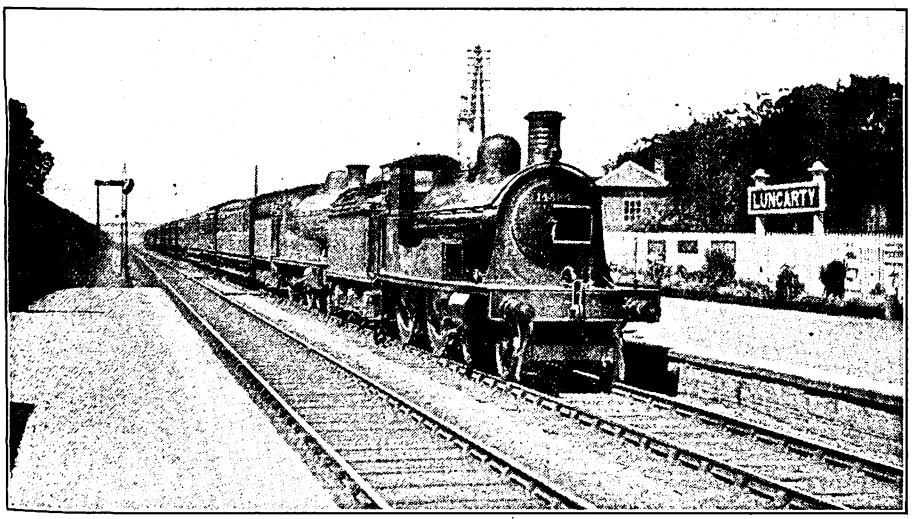

Photo.] [*H. Gordon Tidey.*

INVERNESS–PERTH TRAIN PASSING LUNCARTY.

Highland 4-4-0 No. 14384, *Loch Laggan*, and 4-6-0 No. 14691, *Brodie Castle*.

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L.N.E.R. PERTH—EDINBURGH.

Engine: 4-4-2 No. 9901, *St. Johnstoun.*
Load: 40 axles, 281T. tare, 290T. full.

Distance.		Schedule.	Actual.	* Speeds.
miles		min.	m. s.	m.p.h.
0·0	Perth	0	0 00	—
2·0	Hilton Junc. ..	4	4 50	—
3·5	Bridge of Earn ..	6	6 40	54
3·8	Mile-post 44 ..	—	7 00	—
4·8	,, 43 ..	—	8 10	47½
5·8	,, 42 ..	—	9 37	38
6·8	,, 41 ..	—	11 25	30
7·8	,, 40 ..	—	13 35	27
8·8	,, 39 ..	—	15 55	26
9·8	,, 38 ..	—	18 14	26
10·1	Glenfarg ..	19	18 55	26½
10·5	Mile post 37¼ (St.)	—	19 50	26½
13·6	Mawcarse Jc. ..	—	23 10	60
16·1	Milnathort ..	—	25 40	64½
17·2	Kinross Junc. ..	29	27 25	—
3·7	Blairadam ..	—	5 20	57
5·9	Kelty	10	8 00	†30
8·1	Cowdenbeath ..	14	12 10	26½
11·5	Halbeath ..	—	16 10	61½
11·9	Townhill Jc. ..	18	16 40	†35
13·7	Dunfermline ..	21	19 50	—
2·2	Rosyth	—	3 30	62½
3·7	Inverkeithing ..	5	5 15	†40
5·7	Forth Bridge N.	9	8 50	36
7·4	Dalmeny ..	12	12 25	—
10·4	Turnhouse ..	—	15 55	64½
13·4	Saughton ..	—	18 55	‡62½
15·7	Haymarket ..	22	21 20	—
16·9	Waverley ..	25	23 40	—

* Max. and min. speeds by chronograph.
† Service slacks.
‡ Min. 56½ m.p.h. between Turnhouse and Saughton.

shows the running performed in greater detail.

Of the East Coast Aberdeen route I regret to say that I saw nothing last year, and my journeys between Carlisle and Edinburgh were confined to one very dull effort behind "Atlantic" No. 9906, *Teribus*, which, although receiving its train 17 min. late off the L.M.S. at Carlisle, was content to regain a minute to Longtown, and to keep strict time thereafter, reaching Edinburgh, by a slight economy in station times, 15 min. late. From Carlisle to St. Boswell's we had only 180 tons, but at that junction the load was made up to 245 tons (34 axles), and we did the best work of the journey in climbing from Galashiels up to Falahill, 15·5 miles, in 26 min. 25 sec., with a maximum rate of 47 m.p.h. at Stow (attained up 1 in 175-200) and a minimum of 31½ at Falahill. The train concerned was the 1·5 p.m. from Carlisle.

From a Glasgow correspondent some interesting details of the running over the Edinburgh–Glasgow section of the late North British lines have come to hand, and with these I have next to deal. The first east-bound run, with a "relief" to the 4 p.m. Newcastle and Leeds express, "features" one of the Great Northern superheated 4-4-0 engines—No. 3065—which seem now to have found a permanent home north of the Border. The load was light, and after an exceptionally rapid ascent of the 1 in 42 ascent to Cowlairs—with 0-6-2 banking assistance in rear, of course—No. 3065 did little further of note; the two pitfall checks, beyond Lenzie and in Falkirk Tunnel, were duly observed, and the other minimum speed was 52½ m.p.h. at Winchburgh, maxima of 60 at Dullatur, 65½ at Manuel, and 61½ at Saughton being also attained. There was a slight signal check outside Waverley, net time being about 59 min. Allowance has not been made for the pitfall checks, which are now apparently permanent.

Great Central "Directors" figure in the other two runs. *Laird of Balmawhapple* had to contend with signal checks as well as the pitfall checks, and so did badly to Polmont, but some fine running followed, the 8·5 miles from Winchburgh to Saughton being covered in 7 min. 37 sec., with a maximum of 70 m.p.h. So Haymarket, 21·1 miles from Polmont, was passed in 22 min. 50 sec., and after a slight signal check Waverley was reached in 26 min. 33 sec., or 25¾ min. net. On the basis of this running a non-stop journey from Glasgow to Edinburgh might be expected to take about 54½ min. to passing Haymarket, and 57 min. to Waverley stop, given a clear road but inclusive of the pitfall checks. *Colonel Gardiner*, with a 46-axle train of 360 tons, barely kept the 59-minute allowance to Haymarket, not exceeding 59 m.p.h. between the two slacks, slowing to 32 an hour through Falkirk Tunnel, touching 54½ at Manuel and falling to 51½ at Philpstoun, and finally reaching 65 m.p.h. at Gogar.

In the reverse direction an unusual locomotive was provided for the 6.30 p.m. "diner" from Edinburgh, in the shape of

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L.N.E.R. (N.B. SECTION): GLASGOW—EDINBURGH.

Distance.	Engine No. / Load (axles) / ,, (tons tare) / ,, (tons full)	3065*	6398†	6382‡	Distance.	9510§
		32	32	46		40
		195	240	330		301
		205	265	360		325
Miles.		m. s.	m. s.	m. s.	miles.	m. s.
0·0	Glasgow	0 00	0 00	0 00	25·0	38 07
1·5	Cowlairs	4 47	5 23	6 39	23·5	31 15
			sigs.			
6·2	Lenzie	11 10	13 03	13 54	18·8	24 48
		p.w.s.	p.w.s.	p.w.s.		p.w.s.
11·4	Croy	18 20	20 33	20 15	13·6	18 06
			sigs.			
15·5	Castlecary	22 52	26 25	24 45	9·5	14 13
21·8	Falkirk	29 49	33 18	31 00	3·2	6 35
		p.w.s.	p.w.s.	p.w.s.		p.w.s.
25·0	Polmont	33 32	38 28	36 16	22·3	26 07
29·7	Linlithgow	38 05	7 06	41 46	17·6	20 45
35·3	Winchburgh	44 23	12 51	48 14	12·0	15 35
39·1	Ratho	48 32	16 16	52 03	8·2	11 52
43·8	Saughton	53 29	20 28	56 33	3·5	6 32
46·1	Haymarket	56 07	22 50	59 19	1·2	3 27
		sigs.	sigs.			
47·3	Waverley	60 07	26 33	—	0·0	0 00

* G.N. Superheated 4-4-0. † G.C. "Director" 4-4-0, *Laird of Balmawhapple.*
‡ G.C. "Director" 4-4-0, *Colonel Gardiner.* § N.B. 4-4-2, *The Lord Provost.*

L.M.S. (G. & S.W. SECTION): GLASGOW—GREENOCK.

Distance.	Engine No. / Load (axles) / ,, (tons tare) / ,, (tons full)	Schedule.	14219*	360†	14217*	Distance.	Schedule.	*
			24	32	32			32
			126	168	168			168
			140	180	180			180
Miles.		min.	m. s.	m. s.	m. s.	miles.	min.	m. s.
0·0	Glasgow (St. Enoch)	0	0 00	0 00	0 00	7·7	15	14 15
								sig. stop.
1·6	Shields Road	4	3 30	3 40	3 47	6·1	9	9 20
			sigs.					
4·2	Cardonald	—	6 35	6 58	7 05	3·5	—	5 15
7·7	Paisley (Gilmour St.)	12	10 55	11 30	11 35	17·8	28	28 20
2·0	Elderslie	3	3 50	4 10	4 10	15·8	25	25 25
4·1	Houston	—	6 25	6 50	6 45	13·7	—	23 00
6·1	Bridge of Weir	10	9 10	10 10	9 50	11·7	20	21 10
9·7	Kilmacolm	—	14 25	16 25	15 35	8·1	—	17 43
12·6	Upper Port Glasgow Box	—	18 47	21 37	21 00	5·2	12	13 40
			sigs.					
16·2	Lynedoch	24	23 10	25 35	25 00	1·6	4	4 50
17·8	Greenock (Prince's Pier)	28	26 45	28 00	27 35	0·0	0	0 00

* Small-boilered Manson 6-ft. 1-in. 4-4-0. † Large-boilered (rebuilt) Manson 6-ft. 1-in. 4-4-0.

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"Atlantic" No. 9510, *The Lord Provost*. A remarkably rapid run was made to Polmont, after a fairly leisurely start, speed rising gradually until it actually reached 77 m.p.h. at Manuel, the average rate from Linlithgow to Manuel being 75·4 m.p.h. But for a very slow stop at Polmont, which always seems the fashion with North British "Atlantic" drivers, an even better time than 26 min. 7 sec. for the 22·3 miles would have been recorded. Both Falkirk Tunnel and Lenzie check were, however, negotiated very slowly, and despite a further maximum of 64 m.p.h. between them, the descent from Cowlairs to Queen Street was made with such superscrupulous caution that the total time from Edinburgh to Glasgow was all but 66 min. It should have been possible easily to complete the journey in the 63 min. allowed when the conditional stop is made at Polmont, with a normal descent from Cowlairs.

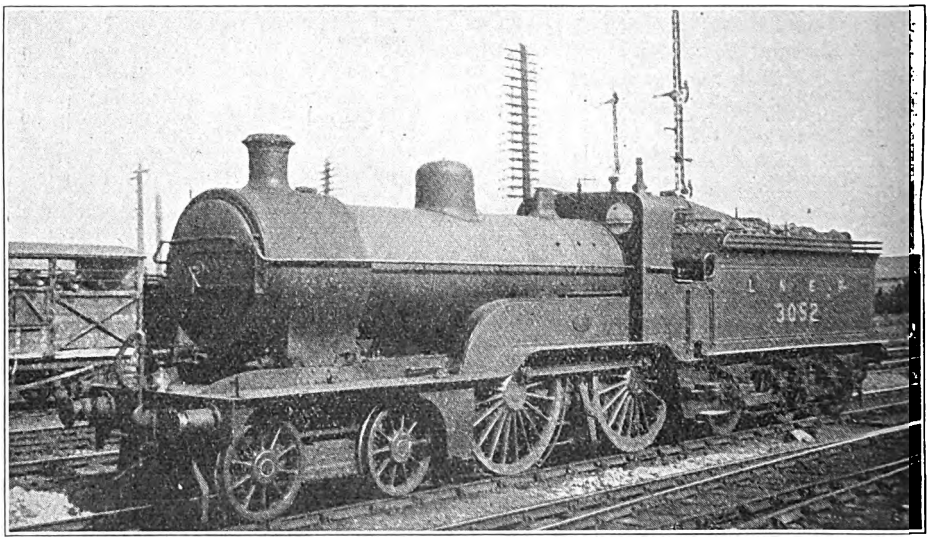

Photo.] [*R. D. Stephen.*

G.N. SECTION 4-4-0 NO. 3052 ON N.B. SECTION, L.N.E.R.

This engine has been fitted with the Westinghouse brake.

Having now returned from our circular tour to Glasgow, by an easy transition we pass on to the metals of the Glasgow and South Western section of the L.M.S. By the kindness of a Dalmellington correspondent, I have first to deal with some runs over a stretch of line which has not previously figured in these articles—from Glasgow (St. Enoch) to Greenock. Here, as on other subsidiary main lines of the G. & S.W. section, the engines are clearly worked hard, and do better work, in proportion to their size, than one is accustomed to record on the easily timed main-line duties. In three out of the four runs tabulated, although the loads were comparatively light, the engines were the diminutive 6-ft. 1-in. 4-4-0's of Mr. Manson's design, with their original boilers; No. 360 carries the larger boiler fitted by Mr. Whitelegg. Through Paisley to Elderslie the route is level enough, but after that come some tremendous grades. There is first a 1-mile dip at 1 in 100 to Cart Junction; then a 1¼-mile rise at 80 past Houston; following come easier grades for 4½ miles past Bridge of Weir, but with strips at 93, 100, 120 and 150; and, lastly, 3 miles at 1 in 100 up to Upper Port Glasgow cabin.

At the bottom of Houston "dip" the three engines attained 66, 62, and 65 m.p.h. respectively, falling to 39, 32, and 36 an hour up the subsequent 1 in 80. On the easier grades beyond there was an increase to 42, 40, and 42 m.p.h., followed by minima of 37, 29, and 30 m.p.h. on the final 1 in 100. No. 14219 had really achieved a remarkably fine performance in covering the 8·5 miles from Houston up to the summit in 12 min. 22 sec., at an

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L.M.S. (G. & S.W. SECTION). GLASGOW–CARLISLE.

Schedule.	14668* 30 194 205	Schedule.	1137† — 150 160	Distance.	Engine No. Load (axles) ,, (tons tare) ,, (tons full)	Distance.	Schedule.	14668* 38 186 195	Schedule.	1065‡ 38 241 255
min.	m. s.	min.	m. s.	miles.		miles.	min.	m. s.	min.	m. s.
37	36 45	38	35 25	24·4	Glasgow	0·0	0	0 00	0	0 00
32	31 55 / 31 25	33	sigs.	22·5	Strathbungo	1·9	4	4 40	4	4 05
	29 10	—	29 05	21·0	Pollokshaws	3·4	—	7 00	—	6 00
24	24 55	24	24 45	16·8	Barrhead	7·6	11	12 30	12	11 05
—	22 45	—	22 00	14·7	Neilston	9·7	—	16 30	—	14 30
—	19 20	—	—	11·7	Caldwell	12·7	—	21 50	—	19 15
16	17 30	16	16 10 p.w.s.	10·0	Lugton	14·4	23	23 45	23	20 55
—	14 55	—	12 45	7·7	Dunlop	16·7	—	26 20	—	23 30
—	10 05 sigs.	—	9 20	5·5	Stewarton	18·9	—	28 45	—	25 50
—	4 25	—	4 45	2·3	Kilmaurs	22·1	—	31 45	—	28 50 sigs.
80	78 50 sigs.	76	67 50	58·1	Kilmarnock	24·4	34	34 30	34	32 05
—	73 40	—	65 05	56·3	Hurlford	1·8	—	3 50	—	3 30
—	66 55 p.w.s.	—	— p.w.s.	—	Garrochburn Box ..	—	—	13 30 p.w.s.	—	10 40 sigs.
61	60 50	62	56 45	48·7	Mauchline	9·4	23	20 00	16	14 40
—	55 05 p.w.s.	—	51 45 p.w.s.	44·3	Auchinleck	13·8	—	27 10 p.w.s.	—	20 30 p.w.s.
—	51 55	—	49 00	42·3	Old Cumnock	15·8	—	30 50	—	23 25
47	46 25	47	43 30	36·9	New Cumnock	21·2	40	38 55	33	29 45 p.w.s.
—	37 45	—	35 15	29·5	Kirkconnel	28·6	—	47 20	—	38 45
33	34 00	33	31 35	26·1	Sanquhar	32·0	51	50 50	44	42 00
—	24 20	—	22 30	17·5	Carronbridge	40·6	—	59 55	—	51 00
18	19 40	18	18 30	14·2	Thornhill	43·9	64	63 30	57	54 10
—	16 05	—	15 10	11·5	Closeburn	46·6	—	66 15	—	56 40
—	11 00	—	10 30	7·6	Auldgirth	50·5	—	70 10	—	60 20
—	6 00	—	5 55	3·4	Holywood	54·7	—	74 10	—	64 20
42	38 20 sigs.	43	21 30	33·1	Dumfries..	58·1	79	78 20	72	68 50
—	33 50	—	16 25	29·2	Racks	3·9	—	6 40	—	6 30
—	28 55	—	11 05 p.w.s.	24·6	Ruthwell	8·5	—	12 35	—	11 55
—	25 10	—	5 25	21·0	Cummertrees	12·1	—	16 20	—	15 10
22	21 50	23	20 25	17·6	Annan	15·5	19	19 40	21	18 50
—	18 50	—	—	14·6	Eastriggs	18·5	—	22 40	—	5 15
—	15 50	—	—	11·7	Rigg	21·4	—	25 40	—	8 30
12	12 00	12	10 30	8·6	Gretna Junction ..	24·5	30	29 15	12	12 00
—	9 15	—	—	6·1	Floriston	27·0	—	32 05	—	14 40
—	7 00	—	—	4·1	Rockcliffe	29·0	—	34 20 sigs.	—	16 50
0	0 00	0	0 00	0·0	Carlisle	33·1	42	42 20	23	22 20

* G. & S.W. 2-cyl. 4-6-0 type. † Midland 3-cyl. 4-4-0 compound, oil-fired.
‡ Midland 3-cyl. 4-4-0 compound, piloted by small 4-4-0 No. 14253 from Kilmarnock to Dumfries. Engines from Glasgow to Kilmarnock Nos. 14199 (small 4-4-0) and 14262 (large-boilered Manson 4-4-0).

average rate of 41·5 m.p.h., even though the load was only 140 tons, and followed it up by attaining 74 m.p.h. on the descent to Greenock, but was nearly stopped by adverse signals at Lynedoch. The other two engines touched 72 and 71 m.p.h. respectively, before making the customary 30 m.p.h. reduction through Lynedoch

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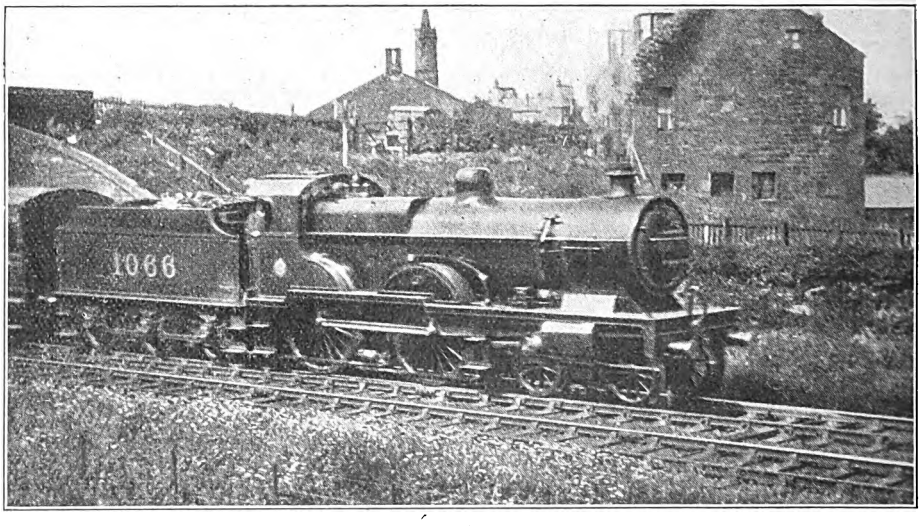
station. The net time of No. 14219 was about 25 min. from Paisley to Greenock, making, with the minute gained from St. Enoch to Paisley, 4 min. to the driver's credit in this short distance.

In the opposite direction there is a terrible start out of Greenock, rising for 4 miles right off at 1 in 69–70, and then for another mile at 1 in 140. Another of the small 6-ft 1-in. 4-4-0's, whose number my correspondent omitted to record, maintained 22 m.p.h. up the former grade, with a train of 180 tons, accelerated to 30 up the 140, went gently down to Kilmacolm with no higher speed than 60 an hour, but after that touched 69 at Carlisle. Matters have livened up somewhat over this route since the advent of the Midland compounds, and the completion of the rebuilding of Mossgiel Tunnel, though the express train timings are still extremely generous, and there is much piloting. It seemed rather a tragedy to me that with No. 1065—one of the best of the whole compound series—at the head of our south-bound train from Kilmarnock, it should be found necessary to provide a pilot through to Dumfries with a load no greater than 241 tare tons, as the engine should have managed it with perfect ease on such a timing as 72 min. for the 58¼ miles.



Photo] [*J. J. Cunningham.*

L.M.S. 4–4–0 COMPOUND LOCOMOTIVE NO. 1066 APPROACHING ANNAN.

Bridge of Weir and 68 at Houston, practically keeping time to Paisley, despite the usual severe slack over Cart Junction. St. Enoch was reached in ¾-min. under the schedule allowance from Paisley, inclusive of a momentary signal stop costing about a minute. These were refreshing little locomotive efforts, well worth description.

I must not be tempted, at this late stage, to wander on to the Stranraer line, though I have some extremely diverting runs over it, but I will keep these for a later date. For the present, therefore, we will content ourselves with details of four journeys over the Glasgow and South Western main line between Glasgow and

From Glasgow to Kilmarnock we were horsed by a couple of Manson 4-4-0 engines—one large-boilered and one small-boilered—which, despite tenders piled high with what seemed to me no better than coal dust, made quite a spirited run, reaching 53½ m.p.h. on the gradual rise which extends almost to Barrhead, and then falling to a steady 31½ m.p.h. up the 1¼ miles at 1 in 100 and the 3½ at 1 in 67–70 which constitute Neilston bank. It is many years since last I recorded a minimum of over 30 m.p.h. up this dreaded ascent. Touching 59½ an hour at Caldwell, we went easily over the "table-land" to Dunlop dropping to 53 ere we began the descent of

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Stewarton bank, on which the maximum was 70½ m.p.h. Despite a slight signal check and a very slow stop, we made Kilmarnock in 32 min. 5 sec., or 31½ min. net—2½ min. under schedule.

Then No. 1065 and her pilot took charge, touching 53½ m.p.h. at Hurlford, and maintaining 37 m.p.h. steadily up the 4¼ miles at 1 in 100 to Mossgiel Tunnel, the relining of which has now been completed. Before Mauchline we were again doing 53½ m.p.h., but were badly slowed there for p.w. relaying; after this the 1 in 150–180 to Auchinleck was climbed at about 45 m.p.h., the usual pitfall check following at the Barony Junction. As we were now well before time, the most leisurely running succeeded, but even a severe p.w. relaying check near Kirkconnel failed to prevent an early arrival at Dumfries by 3¼ min. Maximum speeds were only 65 m.p.h. below Sanquhar and 68 at Thornhill. Net time from Kilmarnock to Dumfries was about 65 min. As I remarked previously, piloting with such a load and timing as this seemed indefensible. After Dumfries, however, the unaided compound made some excellent running, gaining 2¼ min. to Annan and a further ¾-min. to Carlisle, making the gross gains to engines throughout the journey 8¼ min., and the net gains—not allowing for the Barony Junction slack, which is included in the schedule—about 12½ min. We attained 54 m.p.h. on the level to Racks, fell to 46½ m.p.h. on the 2¼ miles up at 1 in 150 that follow, and touched 69 before Annan stop. Maximum speed between Dumfries and Carlisle was 60 m.p.h., below Gretna, the usual slack having been made over the junction.

The comparison 4-6-0 run was made with a lighter train before the introduction of the compounds; the engine worked through from Glasgow to Carlisle. Maximum rate near Nitshill was 48½ m.p.h., and minimum up Neilston bank 28; a top speed of 75 an hour was reached before the stop at Kilmarnock. After re-starting, Hurlford was passed at 41½ m.p.h., and speed had fallen to 27½ at Garrochburn Box, where a severe reduction was made for the passage of Mossgiel Tunnel on the single line which was operated during the re-lining. For this the schedule allowed the generous increment of 7 min., which was rarely, if ever, fully needed, and the driver of No. 14668 then followed the usual practice of adding his "gain" to his running time, only just reaching Dumfries on time. Speed was allowed to drop to 34½ m.p.h. up the rise to Auchinleck, and again to 38½ before Old Cumnock, while the maxima were only

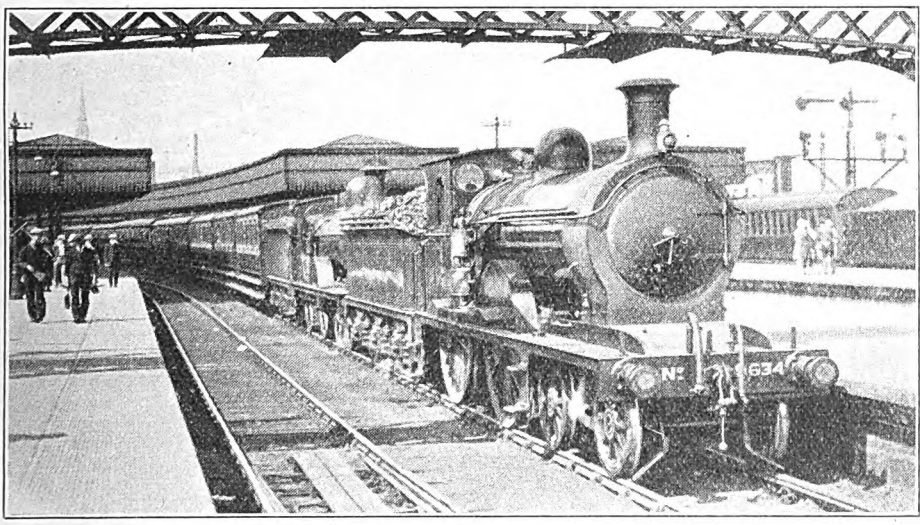

Photo.] ELGIN-ABERDEEN TRAIN AT ABERDEEN. [*H. Gordon Tidey.*

N.B. 4-4-0 No. 9634 and G.N.S. 4-4-0 No. 6893.

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65 below Sanquhar and 64½ before Dumfries. From Dumfries to Carlisle the running with this light train fell far below that of the smaller compound engine; minimum up the bank beyond Racks was 41 m.p.h., and maximum before Annan only 63½ an hour. It is clear that the introduction of competent and efficient locomotives, which have been needed over this route for long enough, might well be accompanied by a reversion to the schedules of pre-war days, which were in some cases —as the present 9.50 and 11.45 a.m. from St. Pancras—from 11 to 13 min. less than those now in force.

Little need be said about the two northbound runs in my last table. No. 14668 had again a light load, and owing to the fact that the Annan conditional stop was not called, gained 3¾ min. to Dumfries. But this required no higher speeds than 63½ m.p.h. at Annan, a minimum of 47 up the 1 in 200 past Ruthwell and a maximum of 66½ before Dumfries. After Dumfries the engine attained 51½ m.p.h. beyond Auldgirth, sustained 45 up the long subsequent 1 in 200, reached 50½ on the short level before Closeburn, and then fell to 42 on the 6 miles at 1 in 150 to Carronbridge Tunnel—the best work of the journey. After touching 61½ m.p.h. at Enterkinfoot, the 1 in 180 to Sanquhar was mounted at a minimum of 49½ m.p.h., and the 1 in 200 to New Cumnock at a lowest rate of 47½. The timing of 47 min. for this practically continuous rise of 36·9 miles from Dumfries is one of the hardest on the G. & S.W. Carlisle route, and to cover the distance in 46 min. 25 sec. was quite creditable. After that the many slacks between Cumnock and Kilmarnock resulted in an average rate of only 40 m.p.h. for this length, the arrival in Kilmarnock being 1¼ min. early. On re-starting the engine got badly checked by signal at Kilmaurs, and so fell to 24½ an hour up the steepest part of Stewarton bank; despite that, with a maximum no higher than 66 an hour on the descent to Glasgow, and the Strathbungo stop, time was kept.

Compound No. 1137, burning oil-fuel, had the first portion only of a divided train, and, therefore, a disappointingly light load of 160 tons. Lost time was, however, substantially regained. Despite an out-of-course stop at Annan, and a p.w.r. check on Ruthwell bank, time was kept to Dumfries, no higher speeds being attained than 63 an hour before Annan and 64½ at Racks. Then the engine touched 56½ an hour at Holywood, and went up both the 1 in 200 and the 1 in 150 to Carronbridge at minimum rates of 49 m.p.h., while the 1 in 180 to Sanquhar and the 1 in 200 to New Cumnock were both breasted at minima of 51 m.p.h. Intervening maxima were 65½ m.p.h. at Enterkinfoot and 57 at Kirkconnel. Very moderate downhill speeds followed, with the check at Barony Junction, and a p.w. slack beyond Mauchline, but even so the engine gained 8¼ min. on schedule to Kilmarnock, and about 9½ min. net. Touching 45½ m.p.h. at Kilmaurs, No. 1137 went up 2 miles at 1 in 180 and 1½ at 1 in 87 at a minimum of 40½ m.p.h.—a fine feat—and only fell from 46 to 34 up the final mile at 152 and 1¾ at 75 past Stewarton. Down to Glasgow the train simply crawled; the Strathbungo stop was not called, and, despite signals on at Gorbals, 2½ min. further were gained to Glasgow. Aggregate gains by engine on this journey, between Carlisle and Glasgow—allowing for checks—were not less than 20 min., and the call for acceleration is thereby further emphasised.

Mention should be made, in conclusion, of the fact that the G.W.-L.M.S. locomotive exchange is, at the time of writing, concluded, though some examination and comparison of the running figures is necessary before they can be presented in a form suitable for publication. I hope, however, that it may be possible to detail my experiences on the trial runs in next month's issue.

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The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

V.—SOUTH AUSTRALIAN GOVERNMENT RAILWAYS.

WHILE the State of South Australia cannot, like Queensland, boast of being the largest system in Australasia, nor, like New South Wales, claim to be the most important transportation system, she can rightly take unto herself the credit of being, at the moment, more generally progressive with regard to freight traffic than any of the other States. In saying this, there is no intention of suggesting that the other railway systems are behind in their general schemes of development. What has been said in previous articles goes to prove that such is not so, but South Australia is at present undergoing a transformation to a high-capacity scheme of transportation. Big developments are taking place in connection with traffic facilities, track improvements, and the provision of large locomotives and wagons, and while it may be said that this is necessary in part owing to the fact that developments of recent years have not proceeded apace, it is primarily attributable to the far-sightedness of the new Chief Commissioner, Mr. W. A. Webb, with whom I had the pleasure of an interesting interview in Adelaide.

The railways of South Australia are distinguished from those of other States in the Commonwealth in that they comprise two considerable systems on different gauges. At June 30, 1924, there were 1,190½ miles of 5-ft. 3-in. gauge track, and 1,261¼ miles of 3-ft. 6-in. gauge track, the total thus being 2,451¾ miles. These railways serve a State with an area of 380,070 square miles, representing more than the British Isles, France, Belgium and the Netherlands put together. The population of the State is 528,518, of which 280,000 are in Adelaide, the capital city. The coast line of the State is about 1,600 miles in length, but along the whole of this lengthy seaboard there is scarcely a river which is navigable, except the Murray, so that a very large proportion of the exports obtain outlet through the railways. The three main harbours of the State are those at Port Adelaide, Port Augusta and Port Pirie, but there are, of course, several smaller ones. The leading features of this extensive territory, with its wonderful variety of soils and scenery, are the vast plains of arable land, largely free from timber, on which are grown the immense quantities of wheat which have gained for South Australia the designation of "The granary of the Southern Hemisphere." It is, in fact, claimed for South Australia that more wheat is produced per head of population than any other State of the Commonwealth, or any other country of the world. In the year 1923–24, 34,551,955 bushels of wheat were produced, averaging 14·29 bushels per acre.

The South Australian Government Railways, on June 30, 1924, employed 10,646 persons (including 676 belonging to the Construction Branch), the total amount paid in salaries and wages being £2,232,032.

Organisation and Administration.

Prior to the appointment of the present Commissioner, the South Australian Railways were administered on the departmental system. When the new Commissioner assumed office, he made a tour over the whole of the lines of the State, and after a thorough investigation, decided that the departmental system should be discontinued, and in its stead a divisional basis of management should be introduced. To this end, five divisions have been formed, with headquarters at Adelaide, Peterborough, Murray Bridge, Port Lincoln and Quorn, each in charge of a Superintendent who reports direct to the Railways Commissioner. The activities of each superintendent cover all departments, so that he has charge of the three branches in his division previously known as Traffic, Locomotive Running and Permanent Way, which are now amalgamated into one. In the terms of the official "Reorganisation" circular on the subject, dated April, 1923, the Superintendent is responsible for the movement of all traffic, and necessary train service,

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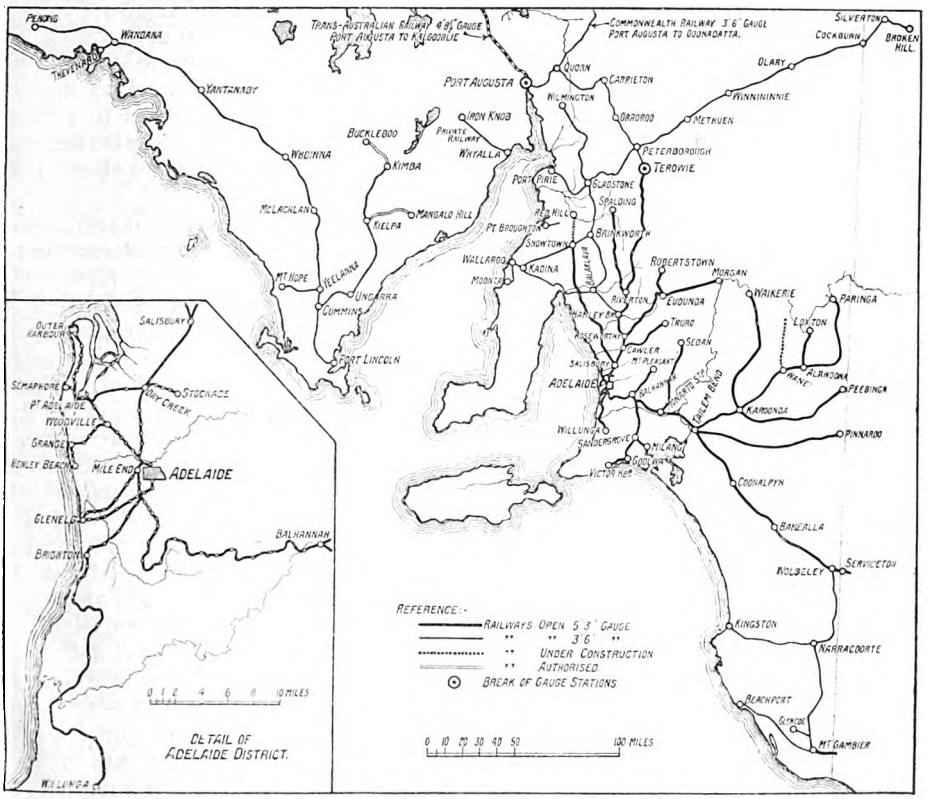
the provision of locomotive power and rolling stock, the control of staff, ordinary maintenance of way and works, leave, passes and privilege tickets, punctual running of trains and station services.

Permanent Way and Works.

The mileage of single-track line on the South Australian Railways at June 30, 1924, was 2,809, and apart from less than 500 miles of 80-lb. section and about 400 miles of 60-lb. section, the bulk of the track comprised 50-lb. and 41-lb. section rails. The steepest grades and sharpest curves on the broad and narrow-gauge lines are 1 in 45 and 10 chains, and 1 in 50 and 5 chains, respectively, the maximum speed authorised on the two gauges being 60 m.p.h. and 35 m.p.h. New narrow-gauge lines are being built with a ruling gradient of 1 in 80 in the direction of the traffic.

Considerable development is, however, now taking place in connection with the introduction of heavier rail sections. The lines from Tailem Bend to Paringa, and from Tailem Bend to Pinneroo, constituting in all a mileage of 223½ miles, are being relaid. The existing lines are laid with 41-lb. plant, unballasted, with a considerable proportion of steel sleepers, and the track is now being relaid with 60-lb. plant (rails 40 ft. long) in order to carry the new "Mikado" type locomotives, to which reference will subsequently be made. Additional accommodation is also being provided at the station yards, including passing room for trains 1,500 ft. long. A considerable percentage of the work has already been done on both lines.



Map of South Australian Railways, showing 2,452 Miles of Line.

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long. The ballast consists of broken stone from the Government quarries.

For some time it has been recognised by the South Australian Government that the development of systems on separate gauges could not be beneficial, and, accordingly, under the North Western Railway System Development Act, 1307/1917, authorisation was given for the widening of the gauge on a considerable mileage of railway on the western section. At present, about 206 miles of narrow-gauge railway are being converted to the wider gauge, and when this is completed, all the lines south of the Broken Hill and Port Pirie line will be on the 5-ft. 3-in. gauge, and the break-of-gauge stations at Hamley Bridge and Bowmans will be abolished; 60-lb. section rails are being laid in substitution for the 50-lb. rails of the narrower gauge, and opportunity is being taken during the conversion to remodel station yards as necessary, so that the change over can be made over a section of perhaps 30 miles of line, including station yards, in one week-end. The work involves the replacement of numerous bridges and culverts with new superstructures, designed to carry Cooper's E50 loading.

STRENGTHENING OF BRIDGES.

In connection with the introduction of high-capacity transportation facilities on the South Australian Railways, it has been necessary for many bridges to be strengthened and others to be replaced. The old bridge over the River Murray, which is 1,980 ft in length, and consists of five 120 ft. main spans across the river, has been replaced by a new bridge located on a deviation about 500 ft. down stream from the existing structure. It is 1,880 ft. long and consists of eighteen 70-ft. deck-plate girder swamp spans, two 185-ft. parallel chord riveted truss spans and one 240-ft. curved chord riveted truss span. The substructure is of concrete throughout. The abutments are on rock at a small depth, and the piers for the 70-ft. spans rest on timber piles, 70 ft. to 75 ft. long, which are driven to solid rock. The river piers for the truss spans consist each of 16 ft. diameter cylindrical caissons, sunk by the pneumatic process to solid rock, about 83 ft. below water level, the process of which operation we witnessed on the occasion of our recent tour of inspection. The cylinders are jointed together to form a solid pier just below low-water level. The bridge is a single-track structure and designed for Cooper's E50 loading. There are 11,000 cub. yards of concrete in the substructure, and approximately 1,540 tons of steel in the superstructure. The approaches to the bridge involve about 60,000 cub. yards of cutting and a concrete-lined tunnel about 3 chains long.

Among other important replacements the existing 110-ft. pony lattice truss over the River Torrens is being replaced by a through double-track riveted Pratt truss, and the two 150-ft. pin connected trusses over the River Light are being replaced by an elevated steel viaduct. This viaduct is located on a deviation 30 ft. upstream from the existing structure, and consists of four 63 ft. and four 33 ft. deck-plate girder single-track spans, supported on steel towers 80 ft. high. At Bridgwater the existing four 70-ft. lattice girders are to be replaced by a 15-ft. reinforced concrete parabolic arch culvert, and about 27,000 cubic yards of earth and stone filling. At Scott's Creek the four 80-ft. lattice girders are being replaced by two similar 15-ft. culverts, and in this case 60,000 cubic yards of earth and stone filling are involved. Besides these bridges, numerous girder spans of all lengths up to 60 ft. are being replaced by stronger girders. The total length of bridge replacement is 6,300 ft. for the North Line and 4,860 for the South Line.

(To be continued.)

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RAILWAY MAGAZINE readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o RAILWAY MAGAZINE, 33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-ninth Annual Edition (1926) of this standard railway reference work is now published. All previous Editions are out of print.

Rail Motor-Car Services.

With reference to your comment upon the illustration in the December number, showing an adapted Ford motor-car used on the Shropshire and Montgomeryshire Light Railway, your suggestion that cars of this kind would provide a means of giving intermediate and additional facilities on sections where train services are very restricted, is a good one in some respects, and, so far as it is practicable, most of the railways are giving the question careful consideration. Hence, the use of "Sentinel" steam cars in various places. With regard to using such cars to provide extra facilities on Sundays, we would point out that, in a number of instances, the question of bringing men on duty, not only for the car itself, but also for signal and station duties, is sometimes a factor. Further, where train services appear to be seriously inadequate, it will often be found that amplification would hardly justify itself, and that the facilities given are quite sufficient for the traffic offering. Your reference to Cadbury Road Halt on the Weston, Clevedon and Portishead Light Railway as a "furthest" smaller station in England is noted.

[Reply to W. E. CALLAM.]

Mileage of Electrified Lines, S.R.

The total route mileage of electrified lines open and worked on the Southern Railway at December 31, 1925, amounted to 155 miles 37 chains made up as follows: L.S.W. section and Waterloo and City Railway, 84 miles 17 chains; L.B.S.C. section, 39 miles 31 chains; S.E. and C. section, 31 miles 69 chains. To bring these figures up to date the two portions of the S.E. and C. section opened in 1926, consisting of 58 miles 30 chains, must be added, giving a total of 213 miles 67 chains owned and worked by the Company. There are also 5 miles 44 chains of "East London" line, and 4 miles 68 chains of line in the Putney and Richmond districts, which are owned by the Southern Railway, but worked exclusively by the Metropolitan and Great Western joint trains in the former case, and Metropolitan District trains in the latter. This gives a total route mileage owned by the Southern Railway of 224 miles 19 chains.

[Reply to ROBERT HEDGES.]

Cape to Cairo Railway.

The section between Wadi Halfa and Assuan requires a waterway. The Sudan extension southward will probably begin

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at a point between Kosti and El Obeid and, avoiding the Nile, will, it is thought, cross the Bahr-el-Ghazal region (where a reconnaissance has already been made) towards Stanleyville, in the Belgian Congo.

At the southern end there is a clear run from Cape Town to Bukama, in the Belgian Congo, but, up to the present, nothing appears to have been done to link up, therefrom, to the next existing section, that is, Kongolo and Kiudu; and the section north of Kindu to Ponthierville is apparently to remain a waterway. From Stanleyville it is presumed that the line, when constructed, will turn in a north-easterly direction till it meets the existing railway in the Southern Sudan.

[Reply to R. B. B. TOLLINTON.]

Locomotive Regulators.

Your query with reference to regulator arrangements on S.R. 4-6-0 locomotives of the 736E—755E series of Mr. Urie's design is not altogether clear. Mr. Allen's comments on regulator adjustment in the course of his "British Locomotive Practice and Performance" articles apply generally to all locomotives fitted with regulator heads of the double valve pattern, where the small valve moves relative to the larger or main valve. To a large extent the methods of handling a particular locomotive depend upon the type and temperament of the man in charge, and the work which his locomotive is called upon to perform to a given schedule.

[Reply to H. DIXON HEWITT.]

Locomotive Depots, S.R.

Owing to the fact that locomotives are frequently transferred from one running shed to another to meet varying traffic requirements or for other reasons, we cannot undertake to publish replies to inquiries for information relating to the home stations of certain locomotives, as by the time such information was published the engines in question may have been transferred to other depots or taken into the shops for repair. We may, however, refer you to Locomotive Matters section, which often includes mention of the working of the S.R., S.E. & C. section, domeless 4-4-0's of Mr. Stirling's design.

[Reply to "S. E. R."]

Re-Boring Piston-Valve Liners.

The custom in this country with regard to the re-boring of piston-valve liners varies to some extent in the different railway shops. It is sometimes the practice to bore them out to a witness mark, *i.e.*, until they clean up. They are not, therefore, necessarily bored to the same size, nor to the nearest $\frac{1}{16}$ in. or $\frac{1}{8}$ in. The custom in other shops here is to remove $\frac{1}{16}$ in. at each re-boring, thus taking them to the nearest $\frac{1}{16}$ in., and then fitting standardised rings. In this case the piston-valve liners are generally bored to the same diameter for each side.

[Reply to W. WATSON.]

The Midland Railway and Birmingham.

New Street station, Birmingham, was opened in 1847, and for a short time was known as Navigation Street station. The work of enlarging the station was commenced in 1882, and finished in 1885. The line from Gloucester through King's Norton to Camp Hill was opened throughout on December 17, 1840, and the extension to join the London and Birmingham Railway on August 17, 1841. The Birmingham West Suburban line was opened as a local line on April 3, 1876, from Granville Street station to a junction with the Midland main line at King's Norton. [Reply to K. W. WOODWARD.]

Conductor Rails on Electric Railways.

On lines such as the Metropolitan and Metropolitan District, where two conductor rails are used, the positive rail is placed outside, the negative rail being between the running rails. The negative rail is for current return, though some lines provide for this through the running rails. By having separate rails the question of running rail circuits for automatic signalling, &c., is much simplified, while for very heavy traffic the separate negative rail is desirable owing to the large volume of current passing.

[Reply to F. G. E.]

Banking.

It has never been customary to bank trains out of King's Cross, the two tunnels between King's Cross and Holloway making such a practice objectionable. Before the advent of the "Pacifics," heavy down trains were usually banked through the platform when starting from Peterborough, partly to prevent the engines from setting their trains back over catch-points. Banking is unnecessary out o

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Leeds, as the customary weight of the trains does not call for assistance.

[Reply to " PECKETT."]

Locomotive Regulator Handles.

Existing designs of regulator handles have proved themselves, by many years of experience, to be the most suitable for the purpose. A large handle is necessary in order to afford ample leverage, and also —in modern engines—to allow of the working of the engine from both sides of the footplate. Regulators are not suitable for operation by power with the delicacy of movement that is necessary in scientific driving. [Reply to " HOUNSLOW."]

Scottish Locomotives.

We are unable to express any opinion as to whether the particular 4-6-0 locomotives mentioned by you are less satisfactory than other designs, as we cannot call to mind any published particulars as to results obtained upon which an opinion could be based. The other engines mentioned by you have, so far as our knowledge goes, proved very successful indeed.

[Reply to DUNCAN R. WALTON.]

Southern Railway Platforms.

We cannot say which stations on the Southern Railway could take trains of a length which can be effectively hauled by the new *Lord Nelson* locomotive, a question which can only be answered by looking up particulars in regard to principal stations. There are, probably, only two or three stations which could deal with a train of the maximum practicable length.

[Reply to W. ROWCLIFFE.]

Oswestry and the Cambrian Railways.

Prior to grouping, the engineering and locomotive headquarters of the Cambrian Railways were at Oswestry. This explains why Oswestry is an important place on the Cambrian section of the G.W.R., its locomotive sheds accommodating a considerable number of engines and it being also the headquarters for local engineering work.

[Reply to " TALISMAN."]

A Preston Train Mystery.

We are unable to solve the puzzle that you propound, and can only imagine that some of your facts are incorrect. On Saturdays the 12 noon from Morecambe to Manchester (which has, at Lancaster, a connection leaving Windermere at 10.25 a.m.) calls at Leyland at 12.58 p.m., before proceeding to Manchester via Chorley and Bolton.

[Reply to J. JACKSON.]

Level Crossings.

In connection with the reply given on p. 393 of the November issue, under this heading, Mr. Frank E. Faulkner suggests that the ramped pieces of timber from the six-foot up to the crossing level are for walking purposes only, as the lowest link of a three-link wagon chain should hang, at its bottom extremity, 8½ in. above rail level.

[Further reply to " ELLEMESTIC."]

Top-feed.

There are various advantages resulting from the delivery of feed-water into the crown of the boiler instead of on the centre-line, amongst which is the fact that it is broken up into spray and heated by passing through the steam in the upper part of the boiler, thereby becoming well diffused, instead of entering in one cold stream. [Reply to R. C. CHALLANDS.]

Automatic Brakes, S.R. Locomotives.

The 2-6-4T's of Class K, built at Brighton, and bearing the Nos. 791A to 799A, are fitted with steam brakes actuating the blocks on the coupled wheels, and Westinghouse and vacuum gear for operating the brakes on the train as necessary.

[Reply to J. G. STURT.]

Track Circuit.

Special rail-joints of the description you mention, with insulation between the ends of the rails, and round and under the heads and nuts of the fish-bolts, indicate the end of a length of track-circuit, where it is necessary carefully to insulate one rail from the next.

[Reply to W. BROOKES.]

" Launceston Castle."

You may take it that your story of a tug-of-war between *Launceston Castle* and a L.M.S. 4-6-0 is pure fiction; in any event, the higher tractive effort of the former would make such a result impossible, even if railway companies were to waste their time on such foolish experiments. [Reply to L. & Y.]

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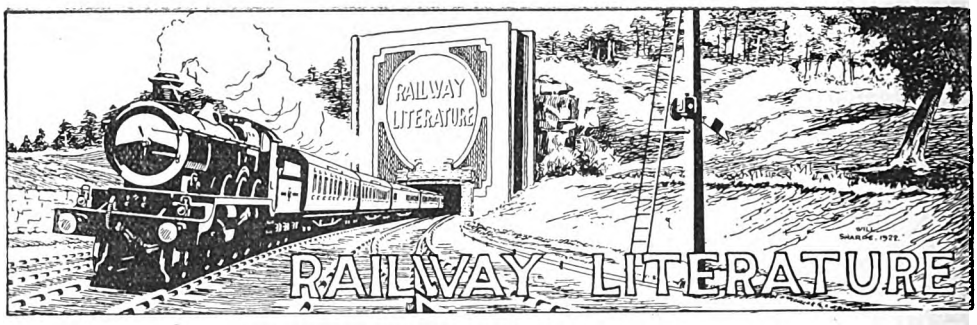

SPECIAL SOUTH AMERICAN RAILWAY NUMBERS OF "THE RAILWAY GAZETTE." No. 1—104 pp., with 149 half-tone illustrations and 24 maps and diagrams. No. 2—88 pp., with 117 half-tone illustrations and 17 maps and diagrams. [Published by *The Railway Gazette*, 33, Tothill Street, London, S.W. 1. Price 2s. 6d. net each.]

This first Special South American Number of the *Railway Gazette* is over and above the ordinary weekly issue, and was published on November 22. As explained in a preliminary notice last month, it is devoted exclusively to the railways of Argentina. The second special number, published on December 6, deals with the railways of Brazil, Chile, Peru, Bolivia, Uruguay, Paraguay, and the smaller railway systems of South America. These special numbers are the result of an extended tour of inspection over the railway systems of South America by the associate editor of the *Railway Gazette*.

The first special number is devoted wholly to Argentina, because that is *the* railway country of South America, and by far the greatest of the Republics in the Sub-Continent. Even in the ample space accorded to it, however, it is hardly possible to do justice to the subject. Argentina possesses special interest for this country because of the preponderating part which British capital, brains, and energy have played in its development. Out of nearly 24,000 route-miles of railway (almost equal to the mileage of the British Isles), 15,757 miles, or 65 per cent. of the whole, are British-owned, and these include the "Big Four" railways of Argentina. The British-owned railways in particular, both in Argentina and in the other Republics, are worked with a high degree of efficiency, and are rendering a great service to the countries in which they operate.

The special articles in this number include detailed and fully illustrated descriptions of the "Big Four" railways: the Buenos Ayres Great Southern, the largest railway enterprise in South America, operating 4,718 miles of 5-ft. 6-in. gauge line; the Central Argentine, the second largest broad-gauge system in Argentina, a progressive undertaking operating 3,305 miles, and the first Argentine railway to electrify its suburban services; the Buenos Ayres and Pacific, ranking as the third largest in Argentina, and forming the major part of the international route to Chile; and the Buenos Ayres Western Railway, comprising 1,882 route-miles, and notable for its electrically-operated suburban service and for its heavy livestock traffic. Other systems described include the famous Transandine line, one of the most interesting mountain railways in the world; the Entre Rios and North Eastern Railways, the Cordoba Central, and the Argentine State Railways, the latter comprising over 4,000 miles of line of various gauges.

Railway organisation in Argentina, which broadly follows the departmental system, is described and illustrated by two typical organisation charts, and there are also articles on the special problem presented by the suburban traffic of Buenos Ayres, and on telephone train control developments in Argentina. Apart from the editorial and other articles, and the numerous excellent maps and diagrams, however, the special feature of interest is undoubtedly the fine collection of typical views of Argentine railways, occupying 48 pages of art paper and comprising 149 half-tone illustrations, showing every aspect of railway life in Argentina. The whole number constitutes a handsome and compendious record of Argentine railways which will prove valuable for reference for many years to come.

The second Special Number is similarly prepared, and deals with the Great Western of Brazil, Leopoldina, San Paulo, Brazilian, Central, Midland, North-Western and Northern of Uruguay, Paraguay Central, Antofagasta (Chili) & Bolivia and Nitrate Railways. Also with the Chilean lines, Buenos Ayres suburban traffic and other matters.

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THE WORLD'S RAILWAYS. By G. Gibbard Jackson. [Published by Raphael Tuck & Sons, Ltd., Raphael House, Moorfields, London, E.C.2. Price 6s. net boards, 8s. net, cloth 7s.]

This volume is intended for presentation purposes, and is illustrated by a number of line sketches, a map, and 14 tone or mono-colour plates, including the cover and wrapper view which shows the Cornish Riviera express, G.W.R. All the illustrations are by Mr. Bernard Way. Some are quite good, but several can only be accepted as adding a splash of colour for the benefit of the youthful reader without regard to appropriateness, as for example, a Great Northern 8 ft. single painted a vivid yellow!

The text is chatty, detailing various items of interest and a number of old stories under respective headings. Following a "Foreword," Mr. Jackson describes the coming of railways and the locomotive, with general descriptions of the leading British railways, references to railways in Ireland, Europe, Asia, Africa, Australia and New Zealand, Canada, U.S.A., Central and South America; and sections on signalling, electric traction, railway carriages, &c. In the course of 165 pages a good deal of ground is covered, though of necessity in outline only.

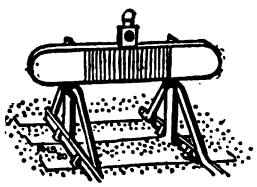
AIDS TO MEMORY FOR FIRST AID STUDENTS AND NURSES. By Vernon Newton, M.R.C.S. Eng. [Published by John Bale, Sons & Danielsson, Ltd., 83-91. Great Titchfield Street, London, W.1. Price 9d. net.]

Among the aids to memory set forth considerable use is made of suggestive initial letters. For example, in view of the fact that appliances are needed in nearly all cases of accident, the initial letters of that word are made to suggest various stages of procedure or appliances needed. In other instances, "alliteration's artful aid" is brought into play, or numerical, letter or other suggestive combinations or peculiarities are utilised. Simple summaries or collections of essential notes are used in other cases.

THE RE-SIGNALLING OF THE SOUTHERN RAILWAY.—The Westinghouse Brake & Saxby Signal Company send a well-produced booklet describing the re-signalling of the Southern Railway between Charing Cross and Cannon Street. A very complete signal plan is given as a folding plate, while the text describes the main features in detail. There are also appropriate illustrations both of track and of signal material.

FOLLOWING a preliminary reference in "What the Railways are Doing" in the December number, we have now received a copy of Messrs. Bassett-Lowke's new model railway catalogue. This is prefaced by three illustrations in colour, showing 2-6-0 locomotives representing L.N.E., L.M.S. and G.W. practice, following which are fully illustrated particulars of locomotive models and rolling-stock, track, signal and other railway material supplied by this well-known firm. Copies of the Section "A" catalogue can be had post free 6d. on application to Messrs. Bassett-Lowke, Limited, Northampton, or from their premises in London and Edinburgh.

BULLETIN No. 12, issued by the Railway and Locomotive Historical Society, maintains the interest of previous issues. Among the contents this time may be noted a description of the Missouri Pacific celebrations in view of the commencement of construction in 1851, so that a history of 75 years is covered; an article on old locomotives at Purdue University; one by Mr. John Duncan on early steam railways in Great Britain; and further contributions on early locomotives in North Carolina; the Brooks Locomotive Works; early locomotives of the Maine Central Railroad; some English single-wheelers; American locomotives in Great Britain; and the New York and New Haven, the Hartford and New Haven, and the Western Massachusetts Railroads. Further information in regard to the Society can be had from Mr. G. W. Bishop, English Representative, 57, Warwick Road, Kenilworth, Warwickshire.



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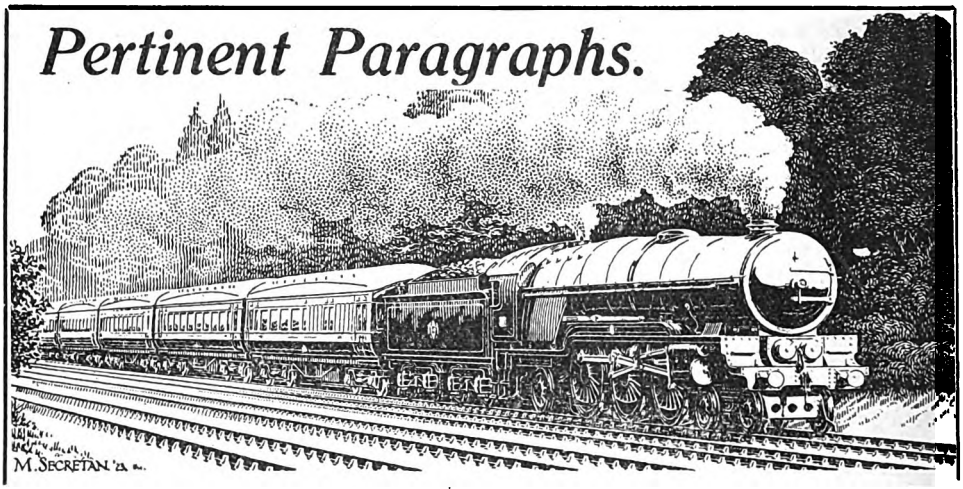
Pertinent Paragraphs.



British Railways and the Coal Stoppage.

Now that the disastrous coal stoppage has come to an end, it is possible to review in some respects the position in which the railways have been placed thereby from the operating point of view, though the resumption of more or less normal activities has by no means solved the companies' financial problems. Particulars made available at the beginning of December from official sources show that at the end of April the home railways held a stock of about 1,700,000 tons of British coal. With a weekly consumption of some 250,000 tons, even allowing for the reduced demands during the general strike, and the policy of conserving these stocks as much as possible, it is obvious that the supply could not last beyond a few weeks, and for a considerable time past foreign coal, largely from America, but also from the Continent and other countries, has had to be employed. In the case of the L.N.E.R., according to a report in the *Evening Standard*, Sir Ralph Wedgwood explained that last May they possessed reserves of half a million tons of British coal. "The weekly locomotive consumption is 85,000 tons, but after the first weeks of the stoppage instructions were given to save this coal for passenger expresses only. This was done, and there is now only 2,500 tons of the coal left. After the first month of the dispute the bulk of the services were maintained almost entirely by imported coal. Nearly 2,000,000 tons have been purchased from America, besides large quantities from Silesia and Westphalia."

Experience with Foreign Coal.

One of the difficulties experienced was that most of the foreign coal was found to be unsuitable for engines engaged on heavy duties, while in several instances whole cargoes had to be allocated in particular directions, and used other than as intended, because of unsuitability for efficient locomotive consumption. Even the distribution and handling of this fuel entailed difficulties in that coal for the London area had often to be brought by rail from distant ports, owing to the congestion of discharging berths on the Thames, while the operation of discharging was not always an economic one in that most of the coal-shipping ports are equipped only for outwards traffic, so that effective use could not be made of the appliances otherwise available. Incidentally, this statement points out that the necessity for making extended contracts will entail the partial use of foreign coal for some time ahead. It is further explained that although selected grades of foreign coal have given reasonably good results, none has equalled the quality of home-produced fuel, while considerable credit is due to railwaymen in that they have carried out their duties as well as they have while handicapped by the inferior quality of fuel supplied for engine use. Further, these difficulties must still apply for some time ahead and, until the railways are again able to use only British coal, it is not to be expected that the usual high standard of punctuality will always be reached.

Experience has shown that, although foreign coal has enabled the railways to maintain train services at practically normal level since May last, while it is admitted that, with careful selection, it may be possible to obtain foreign coal which will give satisfactory results for railway working generally, no imported fuel has been found to give quite as good results for express train working as British coal. To ascertain the heating capacity of foreign types of coal which were received by the railways, and to mini-

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mise delays and possible engine failures as far as possible, practical tests have been made. On one line, from sixteen selected cargoes, only two were found suitable for express passenger trains, six were considered suitable for short passenger journey workings, and of the remaining eight all were found to be quite unsuitable for passenger locomotive use.

Proposed New Southern Railway Station for Epsom.

At the present time there are two Epsom stations—" Epsom," situated on the Western Section, and " Epsom Town," on the Central Section, quite near to one another ; they are both equipped for dealing with all classes of traffic, but, for greater economy and efficiency, it is necessary to concentrate passenger traffic at one station and goods traffic at the other. The directors of the Southern Railway have now sanctioned a scheme which will, to all intents and purposes, mean the erection of an entirely new passenger station on the site of the existing Western Section station, and the concentration on the Central Section station of goods traffic exclusively. It is anticipated that the proposed alterations will involve an expenditure of about £90,000. It may be pointed out that the Western Section station is very conveniently placed for dealing with passenger traffic, while trains on both sections pass through it, though the track and platform arrangements allow only of Western Section trains calling. The new station will be designed to permit of trains on both routes using it.

To re-arrange the lines and to provide adequate platform accommodation and station buildings will involve the erection of an entirely new station, which will include two island platforms, each 650 ft. long and 35 ft. wide, protected over part of their length by an awning 300 ft. long. One of these platforms will serve up trains of both the Western and Central Sections, and the other, in like manner, will serve the down trains of both sections. The station buildings will be erected on the ground level, near the foot of the approach road which leads to the present station, and a subway will be constructed to afford access for passengers to and from the platforms, while another subway will be built fitted with lifts for dealing with the milk, fish, and parcels traffic. There will also be a loading dock, 200 ft. long, for dealing with horses.

Cannock Chase Collieries Light Railway.

Application is being made to the Minister of Transport, by the Cannock Chase Coal Owners' Association, for an Order sanctioning a proposed light railway under the above title. The proposal includes two railways—No. 1 (11 miles 3 fur. 8·85 chains in length), and No. 2 (4 miles 4 fur. in length). Railway No. 1 starts at Brereton, in the vicinity of the Brindley Heath pit of the West Cannock colliery, and will serve No. 1 pit of the same colliery. It will cross the Watling Street at Bridgtown, and will pass through Laney Green, Shareshill, Featherstone, and Fordhouses to a junction with the Shrewsbury and Birmingham line of the Great Western Railway at Wrottesley, about 3 miles north of Wolverhampton, thus giving the Cannock Chase collieries a direct access to the Great Western Railway, which at present they do not possess. Railway No. 2 starts at Norton Canes by a junction with the existing Cannock Chase and Wolverhampton Railway, and ends by a junction with the proposed Railway No. 1 at Laney Green, which is about midway between the two termini of that line.

Railway Benevolent Institution.

In connection with the customary New Year's Day Collection, Mr. E. A. Lane, general secretary of the Railway Benevolent Institution, 12, Euston Square, N.W.1, will shortly be circulating to all station masters, goods agents and others throughout the country the usual explanatory circulars and lists. It is hoped that all railway employees, including women, will become members of the Casualty Fund for 1927, for which the collection is chiefly made, by each subscribing one shilling, which is the amount required to entitle the member, should occasion arise, to participate in certain specified benefits, irrespective of means from other sources.

We understand that no fewer than 195,890 persons became members of this year's fund, and that assistance has been rendered to 98 widows of men killed, 568 widows of men dying from natural causes, and 5,395 men injured.

The collection also affords an opportunity for those in the service who are under 45 years of age to become members of the General Fund, from which assistance is rendered in qualified cases in the form of gratuities or annuities, varying from £5 to £26 in the Officers' Department and £5 to £20 in the Servants' Department, according to length of membership, to permanently incapacitated members in necessitous circumstances, and widows who are left in distressed circumstances, educational and maintenance privileges being granted for children.

The total amount distributed by the Institution to April 30 last was £2,012,483.

New Railway Bridge for Burma.

Mr. G. A. Hicks, writing from Rangoon, sends the artistic drawing reproduced, showing a new bridge built by the Burma Railways Company over the Myitnge River,

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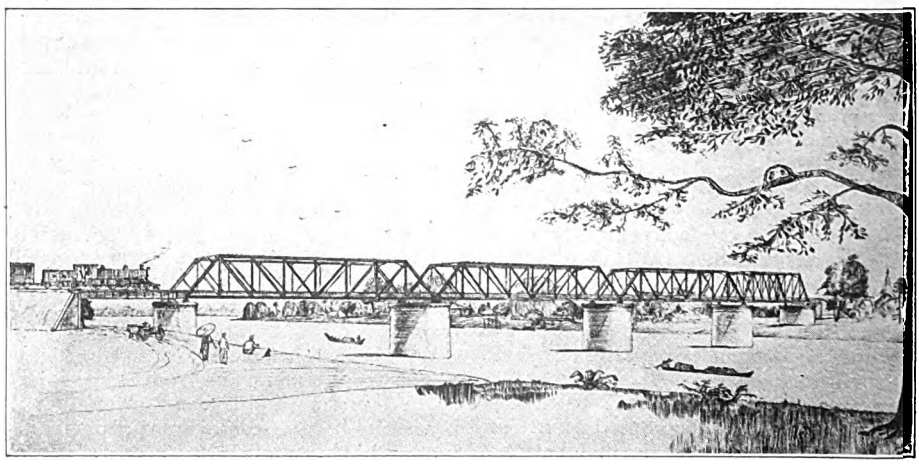
about nine miles south of Mandalay. It consists of four spans of 150 ft. and two of 40 ft. The girders are up to the full standard for a metre-gauge railway. As there is always water in the river, the piers had to be founded on steel caissons floated out and sunk into position. The north abutment is on a well, but the south abutment is on open foundations. The depth of water, as seen in the picture, is about 35 ft. The total cost was about £60,000 and the bridge was completed in just under two years.

Fast Freight Traffic on the G.W.R.

Two important additions have been made to the services of fast freight trains operated by the Great Western Railway. One is designed to enable traffic for the West of England to be delivered the next morning after despatch, a result which has not hitherto been practicable unless sent off early. The train leaves Old Oak Common at 9.32 p.m., and is booked to call only at Newbury Race Course station (for examination and engine duties and making connections with feeding services) to Newton Abbot. The second stage, of 140¾ miles, is the longest non-stop run yet given to a freight train, vacuum-fitted in this case, on the G.W.R. Beyond Newton Abbot it serves Liskeard (the first detaching station), St. Austell, Truro and Penzance, due 10.40 a.m. The up train is designed to foster the important and ever-growing meat traffic from the West of England to Smithfield market in London. It runs from Exeter, serving directly or by connections Cullompton, Uffculme, Tiverton and Tiverton Junction, South Molton, Dulverton, Taunton, Chard, Ilminster, Martock, Weymouth, Bridport, Frome, Chippenham and Trowbridge, and is due at Old Oak Common at 11.25 p.m., thus enabling meat to be delivered at Smithfield market soon after midnight, over six hours earlier than hitherto.

The District Railway and Hounslow.

At the end of November an additional line was brought into use between Hounslow Central and West stations, thus removing the only instance of single-line working on the Metropolitan District Railway. Considerable interest attaches to this section of the District line. When first built there was a branch to a station known as Hounslow Town, fronting on the High Street, and local trains were run between Osterley and Heston and Hounslow Barracks (now Hounslow West) The branch was single line throughout. In later days, round about the electrification period, the Town branch was closed, though part of the embankment remains, and the station is now a garage. Double-track was completed to Heston-Hounslow (now Hounslow Central) station, the final stage still remaining single. The terminal station originally had a run-round line, but with motor-coach electric working the necessity for this disappeared, and for some years past the branch has had the distinction of being probably the only stretch of line on which frequent trains were run consisting of one running line only without points or sidings. Hounslow Central has been the reversing station for trains which did not work through.



NEW RAILWAY BRIDGE FOR BURMA.

The Solway Junction Railway.

The Solway Junction Railway was incorporated by Act of June 30, 1864, to construct a line from the Caledonian Railway, near

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Kirtlebridge, to the Brayton station of the Maryport and Carlisle Railway, and certain branches in connection therewith. Later, under Act of July 23, 1865, a number of deviations were authorised, and power was given to utilise part of the Glasgow & South Western Railway in order to connect up the Maryport and Carlisle station at Brayton.

It commences at a junction with the Caledonian main line from Carlisle to Glasgow at Kirtlebridge and runs in a southerly direction. The first station on the route is Annan, 5½ miles from Kirtlebridge, and here the G. & S.W. Carlisle-Glasgow main line is crossed. Shortly after passing Annan the line approaches the Solway Firth and crosses by means of the Solway Viaduct. This viaduct is one of the longest in Great Britain, measuring well over one mile from end to end. The track is carried on piers of somewhat light construction thus restricting the loads which can be worked over it. In particularly bad weather it was often found necessary to stop all traffic over the bridge. In 1881, after an exceptionally severe frost, several spans were carried away by ice, and the line was closed for three years to allow of reconstruction of the viaduct.

It had remained in use more or less continuously until the war period, when the fact that required repairs and strengthening could not be carried out caused this section of the line to be closed. Subsequently nothing was done, and the L.M.S.R. recently stated that it was not proposed to reconstruct the viaduct as would be necessary to enable traffic to be reinstated. Consequently, trains have for a number of years past run only between Kirtlebridge and Annan.

On the south side of the Solway Firth, about a mile beyond Whitrigg, the North British (L.N.E.R.) line from Carlisle to Silloth was joined, and, after 3¾ miles, left again at Abbey Junction, whence the line proceeded through Bromfield to a junction with the Maryport and Carlisle main line at Brayton, a distance of 21¼ miles from Kirtlebridge.

From its opening in 1870, the line was worked by the Caledonian Company, and by the Act of July 15, 1863, the company became owners of the northern section, between Kirtlebridge and Annan, now part of the L.M.S. system.

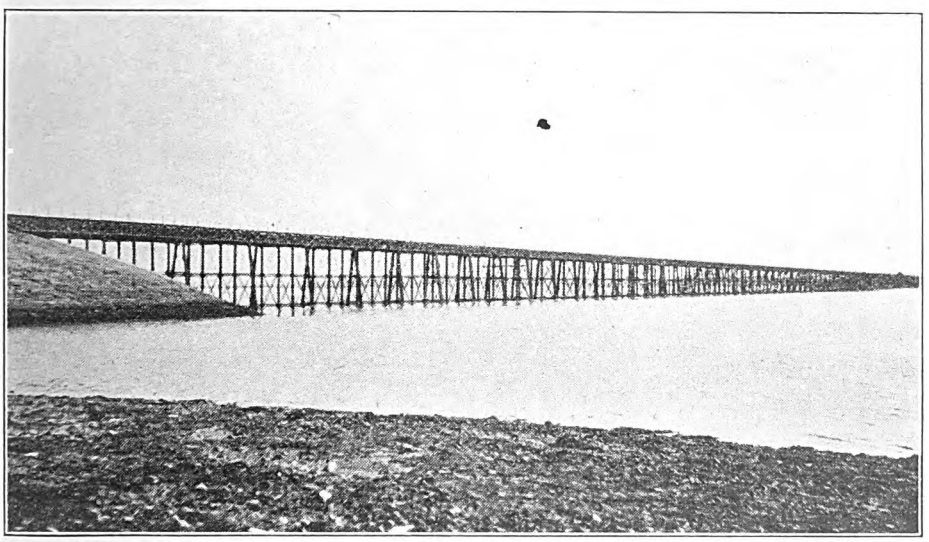

Photo.] THE SOLWAY JUNCTION VIADUCT, L.M.S.R. [*J. J. Cunningham.*

The Vigilant Engine Driver.

SEEING that one of the imperative necessities of engine driving is to exercise continual vigilance, though this is, in this country, largely restricted to timely and intelligent observation by enginemen, it seems rather beside the point to comment upon the vigilant engine driver in that every driver should, at all times, act up to the required standard in this respect. There are, however, "degrees of excellence" in this connection, and it occasionally happens that, from one cause or another, possibly through a difficulty on the engine, a driver is not quite so alert for emergency conditions, though he may be quite safe in regard to signal observation, and for that reason we can justifiably comment upon cases calling for special commendation. Thus, in

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connection with the disastrous level crossing accident at Naworth recently, it was shown that the driver acted promptly and commendably, while a further instance of footplate alertness, necessitated by the foolishness and, apparently, cowardly callousness of some youths, has come before our notice. According to reports of a charge of trespassing heard by the Poole (Dorset) magistrates, several youths, or one of them, held a small boy on the line in front of a fast train. Despite sounding of his whistle, the boys did not disperse, and the driver was forced to make an emergency stop (in about 50 yards) to avert running them down. Deservedly the driver was complimented by the magistrates, and this was endorsed by the railway company's representative who attended the hearing of the charge.

Whitby and Pickering Railway and the Beck Hole Branch.

COMMENTING upon the "Pertinent Paragraph" under this title in the October number, the Rev. H. P. Hart writes as follows:—"The branch from Deviation Junction, Grosmont, to Beck Hole was used for passenger traffic in the summers of 1910-14. A station, or rather halt, was erected at Beck Hole and is still in existence. The line was worked by an auto-car, *i.e.*, a Fletcher 0-4-4 tank and an eight-wheeled coach, which ran four times in the afternoon from Whitby to Beck Hole, and five times from Beck Hole to Whitby; there was no morning service. This service was much appreciated by visitors to Whitby. It is a pity that it has never been revived since the war, the reason given by Mr. Fletcher being that one of the bridges is out of repair. The N.E.R. has made little or no effort to compete with road traffic in the Whitby district, though there are still people who prefer trains to chars-à-bancs, and the pre-war train services have never been restored."

The First Tube Railway.

THE recent opening of the Morden extension of the City and South London Railway, which is the oldest tube railway in the ordinarily accepted meaning of the term, has provoked an interesting correspondence in the *Times*, putting forward the prior claim of the Tower subway and incidentally containing somewhat conflicting statements. In this connection, Mr. Charles E. Lee writes, "The 'tube' method of construction owes its inception to Peter William Barlow, C.E., F.R.S., a famous railway engineer, who had taken up the erection of suspension bridges. While sinking the cast-iron cylinders that form the mid-stream piers of Lambeth Bridge, which he built in 1862-63, Barlow conceived the idea that cast-iron cylinders of similar construction might also be driven horizontally under rivers with perfect safety. He further advocated omnibus subways for the relief of traffic congestion in London, such subways to be bored by an excavating shield and lined with cast-iron segments. In 1868 he obtained powers for a subway

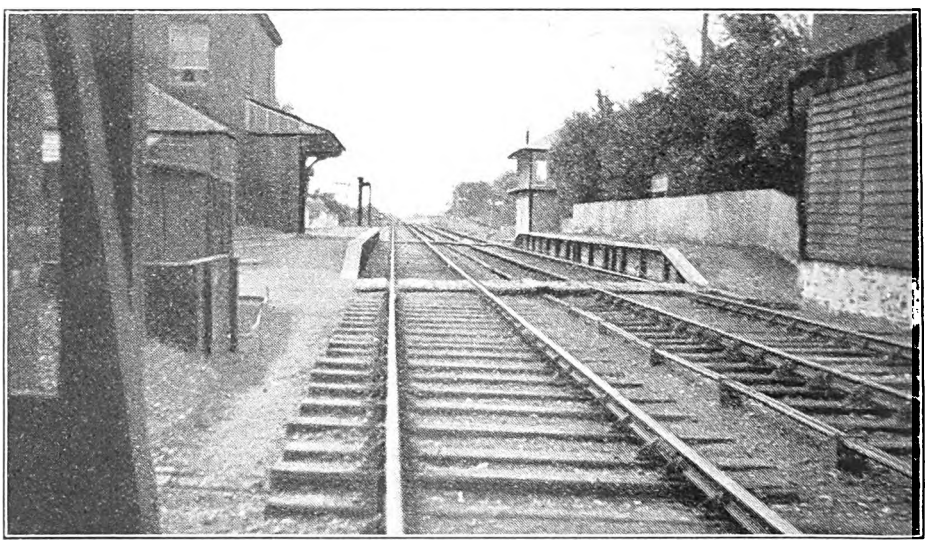

Photo.] BOWNESS STATION, L.M.S.R. [*J. J. Cunningham.*

The first station on the English side of the Solway Viaduct.

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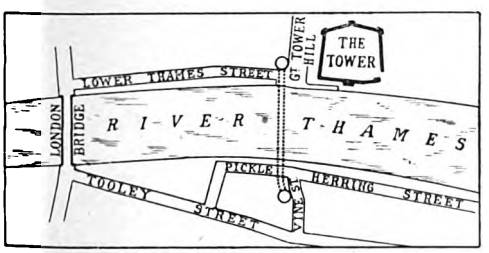
between Tower Hill and Bermondsey, and two years later for a similar scheme from the Monument to St. George's church in the Borough. The latter project was temporarily abandoned through lack of financial support, though it was revived in 1884 and formed the nucleus of the present City and South London Railway. The former undertaking is that known as the Tower Subway. It was constructed in 1869 by James Henry Greathead, Barlow's pupil and assistant, and was opened in 1870, being made in less than a year, at a cost of £20,000. Starting at Great Tower Hill the tube passed almost due south under the Thames to a point near the junction of Pickle Herring Street and Vine Street, as indicated on the accompanying sketch map. It was approached from a 'pepper-box' structure on the ground level at each end, whence spiral staircases containing 96 steps led to the lower level; the original entrance may still be seen on



MAP SHOWING LOCATION OF TOWER SUBWAY.

Tower Hill. The passage consisted of an iron tube 400 yards long and 7 ft. in diameter, which dimensions appear to justify the adjectives 'gloomy and unpleasant' applied by a contemporary edition of Baedaker's Guide to London. It was originally intended for, and opened with, a cable-driven tramcar, but in consequence of several accidents this was withdrawn after operating for a few months only, and thereafter its use was confined to foot-passengers. The undertaking was owned by a joint-stock company The Tower Subway Co. Ltd., of 26, Great George Street, Westminster—who levied a toll of ½d. per person for its use. Records of the early 80's show the annual number of passengers to be upwards of one million.

"In consequence of the opening of Tower Bridge by the City Corporation on June 30, 1894, the subway accommodation was rendered obsolete, and I believe the London County Council subsequently acquired it. The tube is still in existence, though for over a quarter of a century has been used only for conducting electric and other mains across the river."

U.S. Freight Train Speeds.

PARTICULARS recently given in the columns of our New York contemporary *Railway and Locomotive Engineering* show that the average speeds of freight trains in America have considerably increased during the past few years, and this is considered to rank among the most striking accomplishments of the railways in improving transportation. In 1925 the average speed of freight trains was 11·8 m.p.h., as compared with 10·3 m.p.h. in 1920, and in computing the average all stops made for shunting, picking up and for other reasons are included. Owing to the heavier average train load and the higher average train speed, freight trains performed more service per hour in 1925 than at any previous time. The average train, each hour of its trip, performed a service equal to hauling 8,773 tons of freight for the distance of 1 mile, the corresponding figure in 1920 being 7,302 ton-miles. The service performed by the average freight train in an hour on Class I lines advanced almost continuously from 1920 to 1925, the only setback in the course of this progress being in the year 1922, when the tons of freight carried 1 mile amounted to 7,479, as compared with 7,506 in 1921. There was, however, a material increase in 1923, the figure being 7,770, and thereafter an even more rapid advance has been noticeable. It is further pointed out that an outstanding record was made by the railways in 1925 in the use of fuel burned in passenger service, the amount of fuel absorbed in moving a passenger train car one mile being 18·8 lb. in 1920 and 16·1 lb. in 1925.

"Union Limited" Express, Johannesburg to Capetown.

WE are indebted to Mr. Gordon R. Wallace for the photograph, reproduced on next page, showing this train at Park station, Johannesburg, about to start with the "Union Limited" express on its 956 miles' journey to Capetown. The engine is one of the new Baldwin-built 4-6-2's. The "trip" is accomplished in 28 hours, 23 mins.—a world's record for a run of this mileage on a 3 ft. 6 in. gauge railway. The "Union Limited" leaves Johnnesburg twice weekly, namely on Thursday morning, to connect with the mail boat to England, and on Sunday morning, the departure time being 9.50. The new locomotives, more of which are on order, are among the heaviest in the world employed on this gauge. Details of these engines were given in a recent issue of THE RAILWAY MAGAZINE, but the following dimensions are worth repeating: Cylinders, 22 in. by 26 in.; boiler diameter, 6 ft.; working pressure, 195 lb.; total heating surface, 2,706 sq. ft.;

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driving wheels, outside, 5 ft., centre, 4 ft. 6 in.; weight of engine, 192,650 lb. Total weight of engine and tender, 339,230 lb.; Capacity of tender, water, 6,000 gallons, coal, 12 tons. Tractive force, 30,673 lb. The departure of the train is always witnessed by a large number of people many of whom evince considerable interest in the Pacific type of locomotive.

The Most Southerly Railway in the World.

WRITING in reference to the illustration on page 398 of the November number, Mr. D. R. Carling points out that the section of the New Zealand Government Railways from Invercargill to Bluff is not the most southerly section of railway in the world. He states that although Bluff is in South Latitude 45° 37′, there is in Argentina a line from Puerto Deseado running about W.N.W., Puerto Deseado being in South Latitude 47° 43′. "This line will in time be connected with the main system of Argentine railways in the North, but I do not know how far the line reaches at present. Five years ago about 170 miles were in existence. This line, however, does not represent the railway's 'Farthest South.' That distinction is held by a short line, about 4½ miles long, from Punta Arenas to Loreto, in Chile. Punta Arenas lies in South Latitude 53° 10′.

"In connection with this subject of extreme positions of railways, I have carefully studied a good map of the world published about four years ago. In the north and south direction, I find that every degree of latitude from 69° 5′ N., to 47° 43′ S is completely covered by rail at some part or other of the earth, with two small gaps. The extremes are Murmansk, in Russia, and Pto. Deseado, in the Argentine. The gaps (are Singapore 1° 17′ N.) to Namasagati, (1° 1′ N.) in Uganda, and Jinja (or Jinga) (0° 28′ N.), in Uganda, to Stanleyville (0° 26′ N. in the Belgian Congo. The Punta Arenas line covers about 3′ north and south. We have thus a total of 116° 33′ of latitude covered, a good deal of it in several different places at once. In the east-west direction the gaps are larger and more numerous. Going east the first gap is from Byron Bay, N.S.W. (153° 36′ E.) to Kingston, N.Z. (168° 42′ E.). The next are from Napier, N.Z. (176° 58′ E.) to Nome, Alaska (165° 25′ W.); from Shelton, Al. (164° 30′ W.) to Anchorage, Al. (150° W.); from Fairbanks, Al. (148° 10′ W.) to Cordova, Al. (145° 40′ W.) from Kennecott, Alaska (142° 50′ W.) to Skagway, Al. (135° 10′ W.); from Carcross, Yukon, Canada (134° 35′ W.) to Prince Rupert, B.C. (130° 16′ W.); and the last gap is from Pernambuco, Brazil (34° 47′ W.) to Dakar, Senegal (17° 26′ W.). This is seven gaps in all, of which four are in the Alaska district. These four gaps are due to the fact that the Alaskan Railways run more or less north and south, and so, though of considerable length, do not cover many degrees of longitude. The gaps total some 79° 3′, leaving no less than 280° 57′ spanned by rail, or 7/9ths of the earth's circumference. Here, again, much of the distance is covered by several lines at once, especially across America. It is interesting to note that

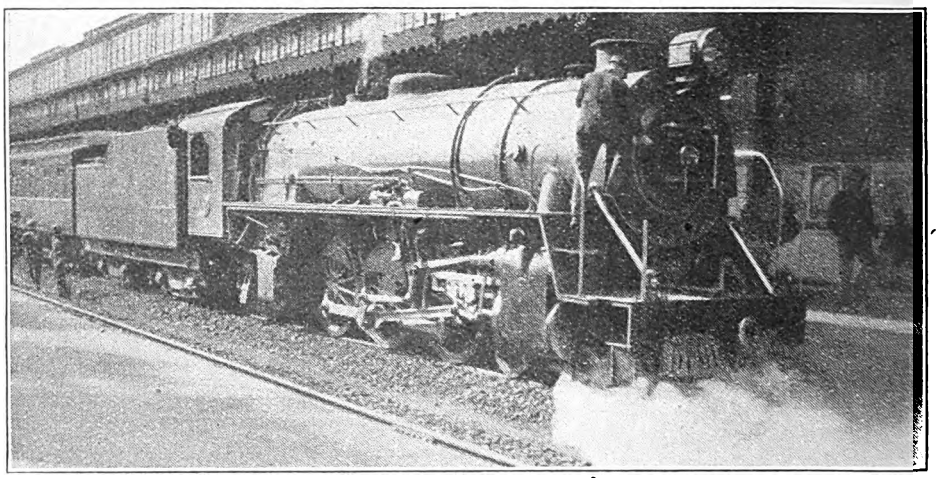

Photo.] [*G. R. Wallace.*

"UNION LIMITED" EXPRESS PREPARING TO LEAVE JOHANNESBURG FOR CAPETOWN, S.A.R.

Baldwin "Pacific" type locomotive.

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the gaps caused by the Atlantic and Pacific Oceans are only 17° 21′ and 17° 37′, respectively."

Railway Bills in Parliament.

THREE of the four great railway companies are promoting Bills for the 1927 Session of Parliament, but so far as can be seen from the Notices published, no railway extensions are contemplated by the existing companies, their programmes of new construction being designed mainly for the improvement of present traffic facilities. The Great Western Railway Bill provides for the widening of part of the Falmouth branch, for a bridge widening, and new road works. The London Midland & Scottish Railway proposals are designed to facilitate traffic working at two points by the construction of the "Rolleston West Curve," and the "Oakenshaw and Crofton Connecting Line," also providing for the construction of a road diversion in substitution for a level crossing at Flint. Similarly, the Southern Railway's proposed new works are mainly widenings, &c., in the London area, new roads in place of level crossings at Richmond and Blackwater, while its projected dock and quay works with a connecting railway near Southampton are in substitution for works already authorised in 1924.

An unusual promotion is that of Pease & Partners Limited, under the title of the Thorne Colliery Railway & Wharf, for the construction of a railway about 6 miles in length from their Thorne Colliery to a point on the bank of the Lower Ouse, where a wharf is to be constructed a short way below the entrance to the Goole Docks. In connection therewith it is proposed to construct an overhead conveyor. Steam or electricity is to be the motive power for the railway which, with the other contemplated works, may be "private," or the promoters may choose to ask for powers to constitute themselves a railway company. Power will be taken to enter into working or other agreements with local, or dock, or river authorities, and with railway companies.

Apart from new construction, the most notable proposal is that of the London Midland & Scottish Railway to remove the disqualification upon a person holding an office or place of trust or profit under the company from being a director. Both in the L.M.S.R. and Southern Railway Bills powers are sought for varying the companies' liability under section 46 of the Railways Clauses Consolidation Act for maintaining the surfaces of roads or of public highways to be carried over any of the intended works, and for making agreements with local authorities with regard to such maintenance. The Southern and the Great Western Bills also make provision as to private street works, and the Southern asks for fresh powers for the retention, use, and disposal of superfluous lands and for the erection of houses, shops, offices, &c., on or over its premises.

No new capital powers are being sought by existing railway companies, except the Southern, which will also take power to subscribe to the North Devon & Cornwall Light Railway Company, and to guarantee interest on Dover Harbour Board stock. Each of the three big railways seeks authority for compulsory purchase and confirming the acquisition of lands and for extensions of time for purchase of lands and completion of works. In the case of the Southern, one of the extensions of time proposed is for the completion of part of the Wimbledon & Sutton Railway. Power will be taken by the Southern to lay electric cables at Beckenham and Epsom, and its Bill also provides for the vesting in the War Office of certain railways and tramways connecting with the Deptford Wharf branch.

A Superannuation Fund Bill is also being promoted by the Southern Railway Company, which will supersede the existing funds of the former constituent companies and make adjustments with the Clearing House.

"No Smoking" Cars on the "Underground."

IN view of the increasing number of smokers the "Underground" companies state that they feel that the time has come to extend still further the concession recently made in regard to smoking in the lifts, and provide some extra accommodation for smokers in the railway cars. Sixty per cent. of the vehicles previously in use were allocated for smoking, and this is now increased to 70 per cent. On and from Monday, November 22, every carriage (on the tube lines only for the present) was open to smokers, except those marked with a special symbol embodying the words "No smoking." This symbol comprises a blue star superimposed on a green disc, and exhibited on the windows of non-smoking cars.

The alteration in the allocation of smoking and non-smoking cars does not refer to the District Railway, where no immediate changes are proposed. On the tube railways, however, all the motor cars are now *non*-smokers, and all the other cars, smokers. This is an advantageous arrangement, in that the motor cars are distinctive in shape and appearance and are always at the ends of the trains, and, in the case of long trains, in the middle as well.

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Exhibition of Railway Models.

On Monday, December 6, the Wimbledon and District Model Railway Club held an interesting exhibition of models made by the members, at the Welcome Hall, High Street, Wimbledon. The exhibits were of a high standard throughout and covered a wide range of practice, from locomotives and rolling-stock to permanent way and shop equipment. During the evening Mr. Percival Marshall presented a number of prizes to successful competitors in the various classes of the competition section, and also the club silver cup. He also made a number of presentations to officers of the club, and as a mark of appreciation for the way in which they had supported the recent *Model Engineer* Exhibition, Mr. Marshall handed the president a suitably inscribed diploma certificate.

When addressing the members on November 1 last, on "The Choice of a Locomotive Prototype," Mr. J. F. Gairns, Editor of THE RAILWAY MAGAZINE, instead of answering the question inferred by the title, offered two prizes, of 10s. and 5s. respectively, for the best short essay on the subject. Mr. Percival Marshall kindly judged these, and the prizes were awarded to (1) Mr. R. C. England and (2) Mr. A. R. Walkley. These two essays are reproduced in the following paragraphs.

MR. ENGLAND'S ESSAY.

To name one locomotive as representative of British practice, it requires, first, the selection of the general type of machine which best presents the characteristics of British design and performance, and secondly, a typical example of that type. It is, of course, evident that the range of work required of locomotives may extend from shunting and goods operation to express "fliers," and still be representative of British practice. But, after all, really high speeds and comfort in passenger work are far more rare and praiseworthy than any goods working or ordinary passenger service. And the British railways are undoubtedly world-famed for their speed and comfort. Thus it seems advisable to take the express locomotive as most representative and typical of Great Britain.

Then, as regards the various express types, although all are used more or less extensively, some are much more general types than others. The 4-4-0 is not a typical express of to-day; "Atlantics" and "Pacifics" are more suggestive of American practice than British, in spite of their outline, and, in addition, can hardly be said to be generally represented on our lines. But the 4-6-0 is truly British, and is practically supreme on the great majority of our systems. So it is easy to go one step further and decide that the selected engine shall, at any rate, be a 4-6-0 express. The chief difficulty, however, arises in trying to proceed further. The types of every company, even of every section, are individual and totally distinct, yet every one is completely British in conception and fundamentals. And it is really doubtful whether any one is more representative than at least some of the others.

Certain outstanding deviations from general design can, of course, be ruled out, such as the Great Western type, which has little or no leaning towards the typical majority. Compounding cannot be accepted as usual British practice, and is therefore excluded. But beyond such deletions little can be inferred apart from personal opinions, and a vast number of 4-6-0 types remain, all of which may be quite representative of British standards.

Owing to the increased requirements of expresses and to loading-gauge restrictions, British express locomotives have, on the whole, assumed an exceedingly massive and powerful appearance, and for this reason the undoubtedly powerful but slim engines of the late North Western may, perhaps, be excluded from the really typical (besides, one can hardly choose a locomotive as being truly representative that is not painted green!); also there is the fact that their type is not being perpetuated to-day.

It would almost seem that a really representative type, to be such, should not only be one which is running, but which is also being built to-day, or at least has not been superseded. Although the "Lord Nelson" type is at present the most modern design we have, and would coincide with most of the generally accepted British standards, it could not be declared properly characteristic owing to the design incorporated giving eight impulses per revolution of the wheels—an innovation, I gather, in four-cylinder practice.

However, the "King Arthurs," which are still being built, exemplify quite modern and usual practice, and in having to name only one representative type, I am personally of the opinion that they thoroughly and perhaps best represent present British practice from an all-round point of view: in wheel arrangement and type; their general design and construction; and in appearance, for the power and the art in their conception—and art is a priceless and almost exclusive characteristic of British express types; and finally, for the work which they perform and the expresses they pull.

It is for the combination of these essentials to British design and practice that I pick a

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"King Arthur," and, of course, in no way in comparison with the relative merits of any individual locomotive or type.

Mr. Walkley's Essay.

In choosing a type of locomotive suitable for working the traffic on my $\frac{5}{8}$-in. gauge model railway, I was influenced by the following factors :—

(1) As the model layout is on a small scale, representing branch-line practice, a tank engine was indicated.

(2) Electric-motor drive being suitable for this small size, a tank would allow maximum space for the mechanism.

(3) An 0-4-4 wheel arrangement would be an additional advantage, as the drivers are ahead, leaving maximum room for the magnet and armature in the "tanks" and cab.

(4) Mr. Drummond's locomotives of this class are representative of British practice in small tanks and, as these locomotives have recently been displaced in the suburban area by electric-traction, a certain sentimental interest is attached to them.

(5) Living at Wimbledon, there was still opportunity to study details on the full-size locomotive or to take photographs if necessary.

(6) It is a suitable type for both passenger and goods traffic, shunting, &c.—a large express locomotive would look out of place on a short line.

(7) It has a distinctive and pleasing outline, short fixed wheelbase, rendering it suitable for fairly sharp curves and the boiler-mountings, &c., would look effective on a model.

WEED SPRAYING ON THE HIGHLAND SECTION OF THE L.M.S.R.

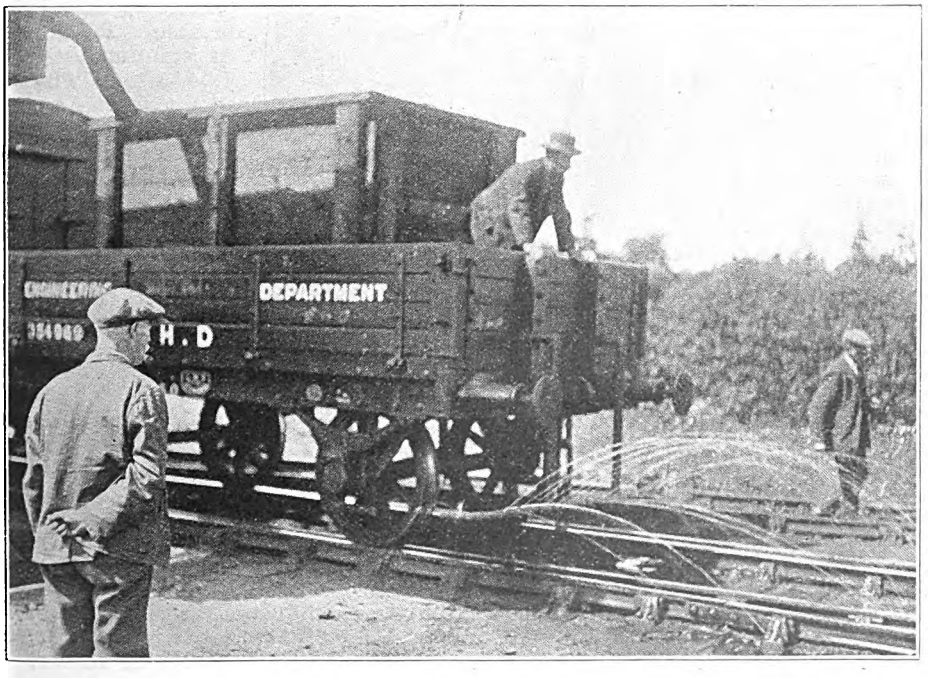

Photo.] [*K. Macdonald,*

WAGON FITTED UP FOR SPRAYING WEED KILLER.

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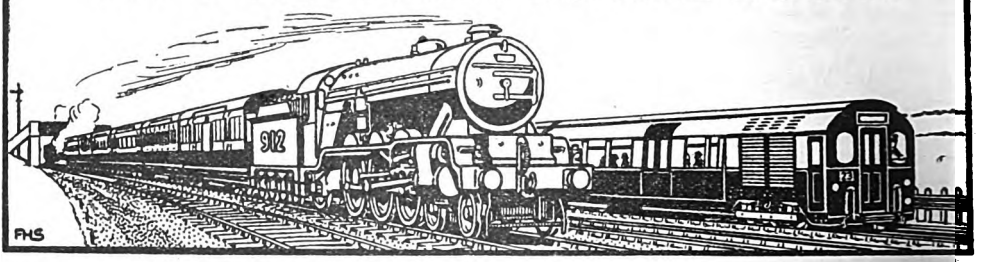
WHAT THE RAILWAYS ARE DOING.



L.M.S.R. Reorganisation and New Appointments.

In connection with their scheme of re-organisation, the directors of the London Midland & Scottish Railway have made further appointments and changes, as under :

Mr. Wm. Clower, O.B.E., at present Assistant to the General Manager (Staff and Labour), to be Chief Officer for Labour and Establishment.

Mr. H. V. Mosley, at present Assistant to the General Manager (New Works, &c.), to be Officer for New Works and Parliamentary business.

Mr. Glynne Roberts, O.B.E., at present Assistant to the General Manager (General), to be Assistant to the President, and Superintendent of the Central Office.

Mr. V. W. Wood, Assistant to the Accountant General (position now abolished), to be Controller of Costs and Statistics.

In consequence of the appointment of Mr. H. L. Thornhill as Chief Legal Adviser to the company, Mr. A. Eddy, Assistant Solicitor, to be Solicitor to the company.

Mr. C. R. Byrom, O.B.E., Assistant Chief General Superintendent, to be Chief General Superintendent, in place of Mr. J. H. Follows, who, as has already been announced, has been appointed a Vice-President.

Mr. J. Murray, at present Outdoor Assistant to the Chief General Superintendent, to succeed Mr. Byrom as Assistant Chief General Superintendent.

Mr. S. B. Carter, O.B.E., Divisional Superintendent, to be Outdoor Assistant vice Mr. Murray.

These appointments and changes will take effect from January 1, 1927.

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Mr. H. L. Thornhill, who has been appointed Chief Legal Adviser, L.M.S.R., as from January 1 next, was appointed Chief Solicitor in January, 1924, prior to which he had been Solicitor to the late L.N.W.R., from March, 1921. Educated at Sutton Valence School, Kent, he was articled in 1894 to the late Mr. C. H. Mason, who was then Solicitor to the London & North Western Railway Company. In April, 1899, Mr. Thornhill was appointed Assistant in the Common Law Department, and in 1903 became Parliamentary Assistant under Mr. C. de J. Andrewes, who was in that year appointed Solicitor to the company. In this capacity Mr. Thornhill also acquired an extensive experience of Railway and Canal Commission practice. He was absent from January, 1915, to April, 1919, on service in France, and during his absence was appointed Assistant Solicitor when Mr. M. C. Tait succeeded Mr. Andrewes as Solicitor in May, 1915. Mr. Thornhill went to the United States in May, 1920, with Mr. Geoffrey Marshall, Goods Manager of the then Great Northern Railway, to study and report on the principles of railway rates. He gave evidence before the Rates Advisory Committee on behalf of the Railway Companies' Association with reference to proposed changes in railway law. In 1921 he succeeded Mr. M. C. Tait as Solicitor, L.N.W.R., as above mentioned.

MR. H. L. THORNHILL,
Appointed Chief Legal Adviser, L.M.S.R., as from January 1, 1927.

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MR. C. R. BYROM, O.B.E.,
Appointed Chief General Superintendent, L.M.S.R., as from January 1, 1927.

MR. GLYNNE ROBERTS, O.B.E.,
Appointed Assistant to the President and Superintendent of the Central Office, L.M.S.R., as from January 1, 1927.

MR. W. CLOWER, O.B.E.,
Appointed Chief Officer for Labour and Establishments, L.M.S.R., as from January 1, 1927.

MR. H. V. MOSLEY,
Appointed Officer for New Works, and Parliamentary Business, L.M.S.R., as from January 1, 1927.

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MR. C. R. BYROM, O.B.E., who has been appointed Chief General Superintendent, L.M.S.R., as from January 1 next, in succession to Mr. J. H. Follows, C.B.E., appointed a Vice-President in charge of Operating and Commercial Sections of the undertaking, at present holds the office of Assistant Chief General Superintendent. Mr. Byrom, who was educated at Shrewsbury School, had a distinguished career on the late London & North Western Railway. He entered L.N.W.R. service in 1896, and after serving in various departments, became, in 1907, Assistant District Traffic Superintendent of the Central Wales and Swansea Division, in 1911 Assistant District Superintendent of the Southern Division, and in August, 1918, Assistant Superintendent of the Line. When, on January 1, 1923, the railways of this country were amalgamated into four groups, of which the L.M.S. is the largest, Mr. Byrom was made General Superintendent (Passenger Commercial), and in July, 1923, he was promoted to the post of Assistant Chief General Superintendent.

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MR. GLYNNE ROBERTS, O.B.E., who has been appointed Assistant to the President, and Superintendent of the Central Office, L.M.S.R., as from January 1 next, was appointed Assistant to the General Manager (General) in January, 1923, though prior to that he had been Indoor Assistant to the General Manager of the late London & North Western Railway since the beginning of the previous year. Mr. Glynne Roberts entered L.N.W.R. service at Holyhead in 1896. Two years later he was transferred to the District Traffic Superintendent's Office at Chester, and in January, 1900, he was appointed Staff and Confidential Clerk to Mr. H. G. Burgess, the then Irish Traffic Manager. In 1902 he was appointed Outdoor Clerk in the Outdoor Goods Manager's office at Manchester, being made an Outdoor Assistant to Mr. F. T. Kinsman in 1908. Mr. Glynne Roberts went to Euston in 1911, and after serving three years on the Chief Outdoor Goods Manager's Staff, was appointed Chief Staff Clerk to the Chief Goods Manager. In October, 1917, he was appointed Assistant Head of Staff Department in the General Manager's office, being re-transferred to the Chief Goods Manager's office as Chief Clerk in February, 1918. He was appointed Chief Clerk to the General Manager in August, 1920.

* * *

MR. WM. CLOWER, O.B.E., who has been appointed, as from January 1 next, Chief Officer for Labour and Establishment, L.M.S.R., has held the position of Assistant to the General Manager (Staff and Labour) as from January 1, 1923. Prior to that he had been Assistant General Manager of the late Midland Railway from July 1, 1920. Mr. Clower entered the service of the Midland Company in the Goods Manager's Office in January, 1880, and in May of the same year was transferred to the General Manager's Office. He was appointed Indoor Assistant to the General Manager on January 1, 1915, and Principal Assistant to the General Manager on January 1, 1919, being promoted to the position of Assistant General Manager, as above mentioned, on July 1, 1920. Mr. Clower is a high authority on railway staff and labour matters, and in this connection was closely associated with Sir Guy Granet and Mr. Frank Tatlow when they were General Managers of the Midland Railway, while he has taken a leading part in proceedings affecting railway staff on a number of occasions since.

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MR. H. V. MOSLEY, who has been appointed, as from January 1 next, Officer for New Works and Parliamentary Business, L.M.S.R., had held the position of Assistant to the General Manager (New Works, &c.), since January, 1923. Prior to that he had been, together with Mr. W. Clower, an Assistant General Manager of the late Midland Railway. Mr. Mosley entered Midland Railway service in 1896, in the General Manager's Office, eventually becoming Personal Assistant to the General Manager in January, 1919, and in July, 1920, Assistant General Manager, as above mentioned.

* * *

MR. V. W. WOOD, who has been appointed Controller of Costs and Statistics, London Midland & Scottish Railway, as from January 1, 1927, entered the Accountant's Department of the late Belfast & Northern Counties Railway in 1898. On the Government taking control of the Irish Railways in 1917, he was appointed Secretary and later a Member of the Railway Accountant's Committee, set up by the Irish Railway Executive Committee. On the formation of the Ministry of Transport in 1919, Mr. Wood was transferred to London as Director of Transport Accounting, and in 1921 was appointed Accountant to the Ministry. In 1924 he resumed railway service as Assistant to the Accountant-General of the L.M.S. Railway.

* * *

MR. ALEXANDER EDDY, who has been appointed Solicitor, L.M.S.R., as from January 1 next, has held the position of Assistant Solicitor since March, 1924, prior to which he had been Assistant Solicitor of the late L.N.W.R. Mr. Eddy is the youngest son of the late Mr. E. M. G. Eddy, formerly Chief Commissioner of Railways for

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MR. V. W. WOOD,
Appointed Controller of Costs and Statistics, L.M.S.R., as from January 1, 1927.

MR. A. EDDY,
Appointed Solicitor, L.M.S.R., as from January 1, 1927.

MR. J. MURRAY,
Appointed Assistant Chief General Superintendent, L.M.S.R., as from January 1, 1927.

MR. S. B. CARTER, O.B.E.,
Appointed Outdoor Assistant to Chief General Superintendent, L.M.S.R., as from January 1, 1927.

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New South Wales. He entered the Solicitor's Office of the London & North Western Railway Company in 1898, when he was articled to Mr. Charles Henry Mason, the then Solicitor of the company. On passing his final law examination in 1904, he was taken on the staff of the Solicitor's Office, and served under Mr. C. de J. Andrewes, Mr. M. C. Tait and Mr. Thornhill. Mr. Eddy is a brother of Mr. J. M. Eddy, the General Manager of the Buenos Ayres Great Southern Railway Company.

* * *

MR. JOHN MURRAY, O.B.E., who has been appointed Assistant Chief General Superintendent, L.M.S.R., as from January 1 next, has held the position of Outdoor Assistant to the Chief General Superintendent, since November, 1924, prior to which he had held the office of Assistant General Superintendent (Midland Division), L.M.S.R. Entering the service of the Midland Railway Company in 1887, Mr. Murray was first appointed as a junior clerk in the Superintendent's Department at Brecon, and, after experience at several stations, was promoted to the rank of Stationmaster in 1893, and to District Traffic Inspector for South Wales in 1899. In 1906, Mr. Murray was transferred to the staff of the District Superintendent for the Bristol Area, and the following year was called to headquarters and engaged for some time under Mr. Cecil Paget in the establishment of train control on the Midland Railway. He was appointed Superintendent of Freight Trains in 1911.

* * *

MR. S. B. CARTER, O.B.E., who has been appointed Outdoor Assistant to the Chief General Superintendent, L.M.S.R., as from January 1 next, was appointed one of three Divisional Superintendents in 1924, his headquarters being at Derby. Prior to that he had been Divisional Superintendent at Liverpool. Mr. Carter was educated at Fettes College, Edinburgh, and entered the London & North Western Railway service in January, 1900. In June, 1904, he was appointed Outdoor Assistant to the Superintendent of the Line, being stationed at Chester, Crewe and Euston during that and following years. In January, 1910, he became District Superintendent in charge of the North-Eastern District, with headquarters at Manchester, and in October, 1914, transferred to a similar office in charge of the Northern District, with headquarters at Liverpool. On the amalgamation of the Lancashire & Yorkshire Railway with the London & North Western, Mr. Carter became, in January, 1922, Operating Assistant to the General Superintendent in charge of the Western Division, continuing in a similar capacity on the formation of the London Midland & Scottish Railway until taking up his new appointment as Divisional Superintendent with headquarters at Liverpool.

* * *

THE following L.M.S.R. appointments have been sanctioned by the Directors:—

Mr. E. G. Purser to be District Locomotive Superintendent, Birmingham.

Mr. C. L. Chambers to be District Locomotive Superintendent, Edge Hill.

Mr. T. Tandy to be District Locomotive Superintendent, Willesden.

Messrs. G. S. Bellamy and J. C. Foster are appointed Assistants to Superintendent of Motive Power, Derby.

Mr. W. Paterson (of Manchester) becomes assistant to Divisional Superintendent of Motive Power, Derby.

Mr. E. L. Booth, of Buxton, becomes Spare District Locomotive Superintendent, Derby.

Mr. F. D. Moulang, District Locomotive Superintendent, at York, is transferred to a similar position at Buxton.

Mr. A. G. Mann succeeds Mr. Glass as Stationmaster at Willesden Junction.

Mr. W. Arrowsmith, Goods Agent at Bow, is responsible also for Old Ford.

Mr. G. A. Stephens becomes Goods Agent, Warrington, vice Mr. A. Moss.

Mr. R. Sunderland becomes Goods Agent, Barnsley (L.M.S.).

Mr. J. Edgar is appointed District Traffic Agent, Belfast, vice Mr. J. Govan.

Mr. J. Russell, District Controller, St. Rollox, to be District Controller, Motherwell.

Mr. J. Adie, Assistant Controller, Motherwell, to be District Controller, St. Rollox.

Mr. R. Marshall, Staff and General Assistant, Glasgow, G.S.O., to be Outdoor Assistant, Glasgow, G.S.O.

Mr. J. Thomson, Indoor Assistant, Glasgow, G.S.O., to be Staff Assistant, Glasgow, G.S.O.

Mr. R. R. Morton, Goods Agent, Paisley Canal, to be Goods Agent, Paisley stations.

Mr. J. N. Smith, District Traffic Superintendent, Dundee, to be District Traffic Superintendent Aberdeen.

Mr. D. Blooman, District Traffic Agent, Dundee, to be Assistant to the District Traffic Superintendent, Goods Commercial, Perth, stationed at Dundee.

Mr. H. G. Rawson, Assistant. C. & W. Stores Controller, Derby, to be C. & W. Stores Controller, Derby.

* * *

WE regret to record the death of Mr. T. D. Morton, M.Inst.C.E., District Engineer, Head Office, Edinburgh, L.N.E.R. For some time past Mr. Morton had suffered from an internal complaint, and did not recover from an operation, his death occurring on November 9. Mr. Morton entered as a pupil in the

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Engineer's Department of the North British Railway, under Mr. James Bell, on January 19, 1899, after which he continued as an Assistant, being mostly engaged in the Constructional Department. He was promoted in charge of the Drawing Office Staff on January 18, 1915, being appointed Chief Assistant on October 14, 1916. On June 6, 1918, Mr. Morton was raised to the position of District Engineer, Head Office, with charge of the Maintenance and Structural Departments, which post he held under the L.N.E.R. at the time of his death.

* * *

We have also to record the death of Mr. A. K. Andrew, A.M.Inst.C.E., Chief Assistant in the Drawing Office at the headquarters in Edinburgh of the Department of the Engineer for Scotland, L.N.E.R. Mr. Andrew was taken ill on November 3, while acting as deputy for Mr. Morton, referred to above, and he also did not recover from an operation which proved necessary. He joined the staff of the District Engineer, Glasgow, North British Railway, on September 11, 1906, being transferred to the Head Office in Edinburgh on February 11, 1907, where he passed through the various branches of the office. In February, 1916, Mr. Andrew joined H.M. Forces, serving in France, Belgium and Italy. He was twice wounded and was awarded the Military Cross, as well as being mentioned in despatches. Mr. Andrew rejoined the railway's staff in 1919. He was appointed in charge of the Structural Department in June, 1920, and, on the transfer of the Senior Assistant as District Engineer at Carlisle, was promoted as Senior Assistant.

* * *

We regret to record the death of Mr. W. H. Oates, which occurred suddenly on the morning of November 12, at his residence in Aigburth, Liverpool. Mr. Oates had held the position of Manager and Secretary of the Cheshire Lines Committee since February, 1925, when he succeeded the late Mr. John E. Charnley. Prior to that Mr. Oates had been Assistant Manager since 1911. Mr. Oates was educated at the Liverpool Institute, and entered Cheshire Lines service in 1881. He remained at Brunswick station, Liverpool, for the first 10½ years, but in 1891 was transferred to the chief office at Liverpool Central station. In 1909 he was appointed Indoor Assistant to the late Mr. Pinion, and in 1911 became Assistant to Mr. Charnley. The remains were interred at Allerton Cemetery.

* * *

Mr. D. W. Auchterlonie, whose death occurred at Carnoustie on November 12, was for many years attached to the staff of the Goods Manager's Department of the late Midland Railway in London. He went to the original City Goods Office of the Midland Railway, known as the "Castle & Falcon," in 1871, serving under the late Colonel Newcombe, then Goods Manager, the late Sir James Allport being General Manager. Prior to that he had considerable experience in India as Manager of the Indian Carrying Co. Ltd. He retired in 1900.

* * *

Mr. R. W. Sparks, who was accidentally killed in June last, in the course of his duties in the Carriage and Wagon Department of the Buenos Ayres Great Southern Railway, obtained most of his experience in Ireland. He was educated at Mountjoy School and Pembroke Engineering School in Dublin, afterwards serving a three years' pupilage under Mr. H. E. Cusack, then Locomotive Engineer of the Midland Great Western Railway. He was then appointed a junior draughtsman, subsequently rising to the position of Senior Draughtsman and Assistant Works Manager. In November, 1916, Mr. Sparks obtained a temporary commission in the Royal Engineers (Railway Operating Division), having complete charge of a company for 12 months. He returned to the M.G.W.R. in March, 1919, as Assistant to the Running Superintendent, and was later appointed Locomotive Carriage and Wagon Superintendent of the Sligo, Leitrim and Northern Counties Railway, which position he filled for six years. In November, 1925, he left for the Argentine to take up an appointment with the Buenos Ayres Great Southern Railway. His progress was rapid, and after filling various positions he was about to be appointed an Assistant Carriage and Wagon Superintendent on the morning he was accidentally killed, at the age of 30 years. The fatal accident was caused by the movement of a detached connecting rod while Mr. Sparks was personally inspecting an inside crank of a locomotive.

* * *

Mr. J. E. Dalrymple, Vice-President in Charge of Traffic, Canadian National Railways, is shortly to retire after completing 43 years' service. He entered the service of the Grand Trunk Railway of Canada in 1883 as a youth of 16, in the Treasurer's Department, but subsequently passed through nearly every other department, thus qualifying for the position from which he is retiring. Mr. Dalrymple is, we understand, to be succeeded by Mr. A. T. Weldon, General Traffic Manager.

* * *

A photograph is reproduced on the next page showing the headquarters staff of the Northern Division of the Nigerian Railway

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when the divisional system was inaugurated some six months or so back. The gentlemen shown standing in front of the engine are as follows: Reading from left to right—Mr. C. H. Webster, Assistant Divisional Superintendent, Road Motors (ex Albion Motor Company); Mr. J. A. Oldfield, Assistant Divisional Superintendent, Operating (ex L.N.E.R.); Major F. A. Pope, Divisional Superintendent (ex L.M.S.R.); Mr. H. A. Freeland, Assistant Divisional Superintendent, Locomotive Running (ex Southern Railway); and Mr. L. Symons, Office Superintendent (ex G.W.R.).

* * *

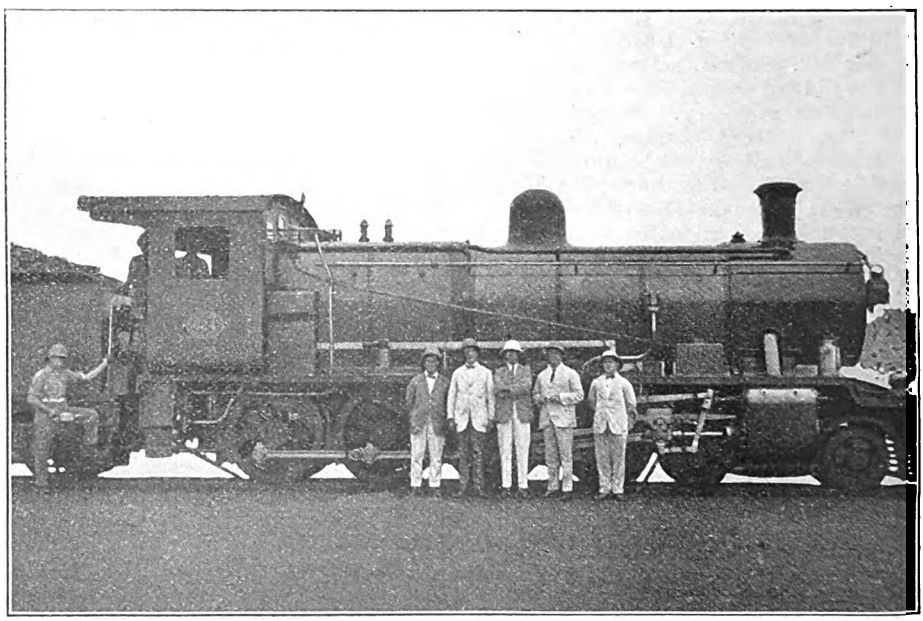
THE L.N.E.R. announce that the office of the District Superintendent, Eastern Division, was transferred from Grimsby Docks to Lincoln on November 8, and all communications should in future be addressed to the District Superintendent at Lincoln.

* * *

THE first L.N.E.R. Musical Society dance of the season was held in the Hamilton Hall of the Liverpool Street Hotel on Friday, November 12. There was a large attendance, and under the guidance of the M.Cs., Mr. Percy Syder and Mr. David King, everything passed off in that pleasant way which is always associated with these dances. Amongst those present were: Sir Ralph Wedgwood, C.B., C.M.G.; Lady Wedgwood; Sir R. Francis Dunnell, Bart., K.C.B.; Mr. James McLaren; Mr. W. M. Teasdale; Mr. A. L. Gibson; Mr. Geoffrey Marshall; and Mr. A. Burton.

* * *

THE largest gathering of members that has been seen at the Railway Club for some time past met in the new premises at 25, Tothill Street, on November 12, with Mr. Cecil J. Allen, President in the chair, to hear a paper by Mr. W. J. Thorrowgood, Signal Superintendent of the Southern Railway, on the subject of "Light Signals." The lecturer traced the development of signalling from the earliest days, leading up to the latest four-light daylight installations on the Southern Railway, which were fully illustrated with actual examples, as well as a series of lantern slides and an ingenious illuminated model. Animated discussion of the paper brought to an end an evening which was much enjoyed by all present. Another largely-attended meeting was held on November 26, when, under the chairmanship of Mr. Lambert H. Bailey, Hon. Treasurer of the Club, a debate was held on the motion: "That substantial accelerations of British express trains are not practicable at the present time." The mover, Mr. E. L. Diamond, B.Sc., put up a very convincing case in support of his motion, backing up his arguments with personal experiences, both in the locomotive sheds and as a driver on the road. In the



GROUP OF NIGERIAN RAILWAY OFFICERS.

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debate, however, it was clear that the opposer, Mr. Cecil J. Allen who was supported by Lord Monkswell, Messrs. Basil M. Bazley, H. W. Bardsley, Willox, W. N. Back and others, had a substantial following, and on the motion being put to the meeting, it was declared to be lost. The attendance at this debate, which was the first of its kind, was sufficiently encouraging to suggest the arrangement of further fixtures of the same nature.

* * *

TESTS have been carried out at the River Spey bridge at Craigellachie, on the Great North of Scotland section, Northern Scottish Area, in view of the contemplated use of larger and more powerful engines which will enable double-heading to be avoided during the heavy summer traffic.

* * *

SEVERAL readers have pointed out that the number of the engine which is illustrated as the frontispiece to the December number is incorrectly given, though the error is one for which we were not primarily responsible. The number should have been 2989 instead of 2898.

* * *

Referring to Mr. Brewer's article on the G.W.R. "Armstrong" class, Mr. H. M. Le Fleming, A.M.Inst.L.E., writes to say that the engine *Brunel* was not fitted with a boiler of the "Atbara" type in 1901; that Nos. 4170 and 4171 have plain, not fluted, side-rods; and that Nos. 4171 and 4172 still carry their names on the driving-wheel splashers, and not on a panel above the splashers, as in the case of No. 4169, *Brunel*. Replying to Mr. Le Fleming, Mr. Brewer states that he was not referring to a boiler of the "Atbara" standard or dimensions, but simply to a boiler of the Atbara *type* or *form*; while, as to the other points, he understood that all of the engines were running as described in the article, similarly to No. 4169 *Brunel*, which is shown with fluted coupling-rods, and with the name fixed on the top of the splasher. He is, however, much obliged to Mr. Le Fleming for drawing attention to the differences between the engines, as mentioned by him.

* * *

MR. J. G. MACCULLUD, writing from Bermuda, points out that the best time of the "International United" express of the Canadian National Railways between Montreal and Toronto is 44·4 m.p.h. and not 39 m.p.h., as previously stated.

* * *

A MODEL to the scale of ¾-in. to the foot is now being displayed in the window of the C.P.R. offices in Trafalgar Square, London, S.W.1 of a new design of ventilated express, car which is being placed in service on the C.P.R. for attaching to passenger trains for the conveyance of fruit and other perishable shipments. The car is specially designed for the particular traffic, especially in regard to the arrangements for providing adequate ventilation.

* * *

UNDER the title, "Lighten our Darkness," the eleventh annual report of that admirable institution, St. Dunstan's, for the period ending March 31, 1926, has been now issued by the executive council. It is attractively illustrated. *Inter alia*, the report states that in the year 1924-25 the blinded soldiers "made and sent to us for sale goods to the value of £26,852, and in the year 1925-26 this had increased to £35,560." Subscriptions should be addressed to "Inner Circle, Regent's Park, N.W.1."

* * *

THE German railways have introduced third-class sleeping cars. The traveller now has the choice of first, second or third-class sleeping accommodation on the main routes. Each compartment in the third-class sleepers is fitted with three sleeping berths on each side. These coaches are, we understand, running on seven routes.

* * *

IN the annual competition for Station Gardens and the cultivation of embankments on the L.M.S. Railway, the six stations adjudged best in England and Wales were Broxton, Alcester, Ashchurch, Charfield, Ockendon, and Penns. In Scotland the nine best were Barnhill, Crieff, Douglas, Dubton Junction, Forfar, Inches, Maxwelltown, St. Fillans, and West Kilbride. Prizes to the value of £1,248 were distributed.

* * *

THE Westinghouse Brake & Saxby Signal Co. Ltd. announce that their representatives licensees, McKenzie & Holland (Australia) Pty. Limited, of Melbourne and Brisbane, have secured an order for further 500 resonated impedance bonds, style "J," bringing the total of such bonds already supplied to Australian railways up to 17,000. Like the previous 1,200, the 500 new bonds will be manufactured within the Commonwealth.

* * *

ON Monday evening, November 29, the London Section of the L.N.E.R. Musical Society's Male Voice Choir rendered four part songs and a madrigal in the studio at 2LO, this being, we believe, the first time the Society has broadcast any of its performances. The selections were interspersed between orchestral items by the Wireless Orchestra.

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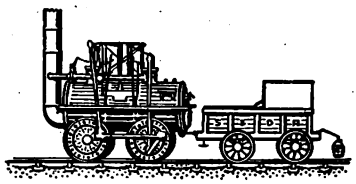
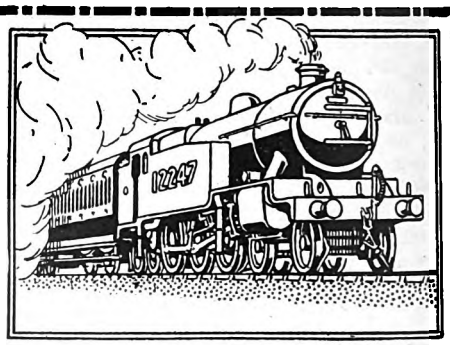
LOCOMOTIVE MATTERS.





Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S R.

Midland section class "1" 2-4-0's Nos. 181, 188, 207, 225, 241, 257, 261 and 265 and 0-4-4T's. Nos. 1288 and 1416, are rebuilt with Belpaire boilers fitted with Ross "Pop" safety valves. 0-6-4T's. Nos. 2025 and 2030 were recently noted on passenger duties in the Normanton district, L. and Y. Section, and 2-4-0 No. 204 has been working between Leeds (Wellington) and Doncaster (Central). Of the "7100" series of 0-6-0T's., No. 7106 is at Wellingborough, No. 7116 at Leeds, Normanton and Midland, No. 7120 and 7136 at Longsight, and No. 7149 at Stockport.—[G. OGDEN HOLT.]

Midland section 2-4-0 No. 96, recently reported as scrapped, has since been noted hauling the special Directors' saloon at King's Norton.—[R. JOHNSON.]

0-6-0T's. Nos. 16426 and 16428 are now at Longsight shed, and No. 16429 at Edgeley shed. 4-6-4T's. Nos. 11111 and 11113, from Longsight shed, work into London Road, Manchester and handle fast Buxton and Congleton residential expresses.—[G. OGDEN HOLT and T. HORN.]

The three new 2-6-0's are working as follows:—No. 13000 from Derby shed, on the Midland section, West of England line; No. 13001 from Newton Heath (Manchester) on the Manchester and Blackpool and Southport lines; and No. 13002 from Low Moor (Bradford), principally between Bradford and Manchester, but frequently on L.N.E.R. (G.C.) London expresses as between Bradford and Sheffield (Victoria). At week-ends the engine sometimes works Bradford-Blackpool "excursions."—[A. P. HERBERT AND H. WHITTAKER.]

New class "4" 0-6-0's Nos. 4207, 4210, 4220, 4221, 4225 and 4226 have been employed on L. and Y. passenger and goods trains from Goole and Wakefield to Hull.—[H. R. GALE.]

"Renown" class Nos. 1911 *Centurion*, 1917 *Inflexible*, and 5131 *Renown*, are shedded at Carnforth, and work regularly over the Furness section. On September 4, compound No. 1944 *Victoria and Albert* was seen at Lake Side (Windermere) on an excursion from Morecambe. New 0-6-0 No. 4224 recently worked a Sunday excursion from Manchester, Victoria, to Grange-over-Sands. No. 4142, of the same type, worked an empty stock train from Patricroft to Workington and returned on a coal train from Barrow. The following have been seen on specials from Leeds to Barrow:—Class "3" 4-4-0 No. 735; class "4" 0-6-0's 4238 and 4240. 4-4-0's Nos. 483 and 759 have worked to Lakeside on specials from Leeds. A Midland class "3" 0-6-0 No. 3351, of Carnforth shed, has been seen on the 10.15 a.m. passenger train from Whitehaven to Carnforth on several occasions. Midland 4-2-2 No. 600 recently worked an inspection saloon from Carnforth to Carlisle via Whitehaven—["FURNESSIAN."]

G. and S.W. 4-6-0 engines very often work heavy goods trains on the Ayr line, and Nos. 14657 and 14661 were noticed on such duties 4-4-0 No. 14183, of the same section, also does heavy goods work occasionally. During a stay in Troon this autumn the following Caledonian 0-6-0 engines on a goods train, which runs daily from Perth to Ayr and *vice versa* were noted:—Nos. 17599, 17615, 17616 and 17631. On the same line, C.R. 4-6-0 No. 14617 was a fairly regular visitor. Highland engines of the "Castle" 4-6-0 type have been seen lately at Muirend (Caledonian).—[TOM DAVIDSON.]

One of the Johnson 0-4-4T locomotives, No. 1337, has recently been rebuilt with a

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new boiler, incorporating closed dome, Belpaire fire-box and "Pop" safety valves. —[L. B. HEWITT.]

In addition to the first of the type, No. 13030, which is at present working temporarily from the Crewe South shed, a further two 2-6-0 mixed traffic engines will shortly be turned out at Crewe, Nos. 13031-2. The new 0-6-0 shunting tanks ex Vulcan Foundry are now all in traffic, Nos. 16460-99 inclusive. Two of the original class "G" simples, Nos. 1539 and 1776, have been converted to class "G1" (superheater), the latter of which is now provided with a standard Belpaire boiler. In the order given these engines have become L.M.S. Nos. 9125 and 9131. Special D.X. goods Nos. 3056, 3131, 3157 and 3501, and special tank shunter No. 3064 have been withdrawn for scrapping.—[C. WILLIAMS.]

Caledonian 4-6-0 No. 14630 (Polmadie shed) recently worked a test train weighing 350 tons Carlisle to Lostock Hall and back. Caledonian 0-6-0 No. 483 worked a fast goods Carlisle L.N.W. to Edge Hill, and Midland 4-4-0 No. 432 Class "2" worked an express from Carlisle to Crewe.

[N. MACKENZIE.]

L.N.E.R.

G.N. section non-superheated 0-6-2T No. 4551 from the London district has been transferred to the West Riding, but still retains the condensing apparatus. G.C. section 0-6-0 No. 5291 has been noted at Bradford.—[A. P. HERBERT AND H. WHITTAKER.]

New "J39" class superheated, mixed traffic, 0-6-0 Nos. 1451 and 1452 have been noted at Hull. H. and B. 0-8-0's Nos. 2504 (123), 2507 (126), and 2511 (130) have recently been through the shop at Darlington, and the Belpaire boilers replaced by standard Darlington pattern superheated domed boilers, "Pop" safety valves, and standard chimneys, but the cabs remain unaltered. A large number of Mathew Stirlings' early 0-6-0's have received superheated domed boilers, "Pop" safety valves, standard chimneys, and extended cabs resembling those fitted to the G.N. "J22" class.

Of the five class "S1" engines, Nos. 2111-4, Nos. 2111, 2112 and 2114, in the green livery, are stationed at Hull and work passenger traffic.—[H. R. GALE.]

Continued evidence of railway grouping at Queen Street station, Glasgow, and during the past month the following engines have been noted:—"Pacific" No. 2566, 0-6-2T, No. 2594, of Great Northern design, and a G.N. 2-6-0. The latter engine recently piloted an Edinburgh train worked by a "Director" 4-4-0. A "Pacific" engine worked the "Lothian Coast Express" for a week or two this summer, later being succeeded by "Director" 4-4-0 *Evan Dhu*.—[T. DAVIDSON.]

G.W.R.

G.W. 4-6-0 No. 5000 *Launceston Castle*, worked the 10 a.m. Euston to Glasgow train from Crewe to Carlisle on November 10 and 12, and returned to Crewe on the 10 a.m. Glasgow to Euston train on the 11 and 13, a L.M.S.R. "Claughton" working the corresponding turns on the alternate days, while Midland section, L.M.S.R. compound 4-4-0 No. 1047 has been working the 1.15 p.m. Paddington and Bristol express. The G.W. engine was returned to the G.W.R. via the Willesden loop to Old Oak, on Saturday, November 20.—[N. MACKENZIE, P. E. NEWSON, and J. R. WEDGE.]

Four-cylinder 4-6-0s are being stationed at Cardiff for the first time. These include Nos. 4006 *Red Star*, 4028 *King John*, 4036 *Queen Elizabeth*, 4059 *Princess Patricia* and 4064 *Reading Abbey*. Consequent upon alterations at Swansea Station, all trains now call there, and a number of through locomotive-workings to Paddington have been instituted. A number of two-cylinder "Saint" class 4-6-0s have, therefore, been stationed there as follows:—Nos. 2901 *Lady Superior*, 2916 *Saint Benedict*, 2917 *Saint Bernard*, 2922 *Saint Gabriel*, 2928 *Saint Sebastian*, 2937 *Clevedon Court*, 2941 *Easton Court*, 2945 *Hillingdon Court*, 2955 *Tortworth Court*, and 2986 *Robin Hood*. *Saint Gabriel*, *Saint Sebastian* and *Clevedon Court* were transferred direct from Fishguard Shed, *Saint Benedict* from Cardiff and *Saint Bernard* and *Robin Hood*, after passing through Swindon Works, from Worcester and Shrewsbury respectively. "Bulldog" class 4-4-0 No. 3407 *Madras*, from Reading shed, has worked through Cardiff on a down goods train. 2-4-0T No. 1192 (with number on rear buffer-beam and initials G.W.R. on number-plate) has recently begun duties on the Culm Valley Branch in the place of 2-4-0T's, Nos. 1298 and 1300 (formerly West Cornwall Mineral Railway), which are believed to have worked the line since it was first opened in 1877. 2-8-0 No. 2873 (from Bristol shed) was observed on an empty coaching-stock train near Cullompton on July 31.—[R.S.C.]

Recently a "28XX" 2-8-0 engine No. 2879 was used between Dolgelly and Barmouth Junction for bridge testing, with a view to employing heavier engines of increased tractive power between Barmouth Junction (C.W. Div.) and Ruabon (Chester Div.). This section has been worked as far as Corwen almost exclusively by the old 5 ft. 2 in., 2-4-0 tender engines of "32" and "35XX" class,

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and by 0-6-0's of "23," "24" and "25XX" class, but the difficult nature of the route and the limited capacity of the engines used has necessitated the running of more powerful engines to deal with the heavy goods and summer passenger services.—[J. A. HIGGON.]

S.R.

Eastern section class "L" 4-4-0's Nos. 773 and 774 have been working on Central section main line between London and Brighton. New 2-6-4T's Nos. 802, 803 and 804 have been working into London off the Reading line. "King Arthur" class engines are now frequently to be seen on the Catford Loop line.—[R. HEDGES.]

"King Arthur" class 4-6-0's Nos. 800E and 801E are now in service, also 2-6-4T, 804-805A. S.W. 4-4-0 703 is super-heated and 0-4-2S's Nos. 544, 633 and 645 have Drummond pattern boilers. Small superheater 4-4-0's 283, 702, 704, 705, 709, 714, 715, 719, 724, 726 and 733 are in West of England district, also 2-6-0's 828, 829A, 834-844, 848, 849, 850-869, 873, 875A.

The new 4-6-0 850E went on S.E. section October 18, and 772E with wind-deflectors fitted to N. Elms during the same week. There are 64 engines in the duplicate list left on the S.W. section.—[TINTAGEL.]

No. 165A has not had its top feed removed and was noted at Ramsgate in its original rebuilt condition, excepting that it is fitted for burning oil fuel. No. 727A has, ever since rebuilding, been fitted with top feed, along with No. 145A. These two engines were the only ones of the original class "D" which were rebuilt with top-feed boilers, although recently many engines in classes "E 1" and "D 1" have exchanged boilers, so that some of each class have top feed now. It is interesting to note that No. 727A is now running with the original boiler of No. 179A, class "E 1," this being the only one fitted with Ross "Pop" valves.—[J. G. STURT.]

S. & D. J. R.

No. 45, one of the 5 ft. 9 in. coupled 4-4-0's built in 1896, has been rebuilt at Highbridge with a Belpaire boiler and enlarged cab. A few of the 0-4-4T's have also been fitted with Belpaire boilers.—["CONSOLIDATION."]

Expresses for the Midlands from Bournemouth are usually worked as far as Bath by large S. & D.J.R. 4-4-0's, bearing the numbers 67–71, although large 0-6-0's have been seen on these trains, such as Nos. 57 and 61. All the S. & D.J.R. 2-8-0's have been seen at Bournemouth this season, bearing the numbers 80–90. 4-4-0 77 has lately been done up, together with 4-4-0 45. S. & D.J.R. tank locomotives are rarely seen at Bournemouth, although occasionally one works through, amongst which are 0-4-4 T's 29A, 30A and 54.—[C. H. MOOR.]

IRISH RAILWAYS.

In the October number the D. and S.E. 0-6-0 locomotive No. 444, stated to be old No. 36, should have read: Old No. 18. This engine is still attached to Bray shed, and works all the cattle "specials" from country fairs to Liffey Junction yards. D. and S.E. 2-4-0T No. 49 has been repaired at Broadstone, and is in service (Canal Street), her new No. being 423. There are only four of these small D. and S.E. tank engines left, Nos. 423 and 424 at Canal Street, No. 425 at Bray, and No. 7 at present in Inchicore works, presumably for rebuilding. All the others have been scrapped. Old W. and L. Railways, 0-4-4T, No. 279 for some time at Canal St. shed, has been withdrawn from service for overhaul, and G.S. and W. 0-6-0 locomotive No. 136, has been transferred to Canal St. G.S. and W. 0-6-0 locomotives Nos. 160 and 200, stationed at Canal Street for summer traffic, have returned to their own section; and No. 652, a M.G.W. 2-4-0, has been returned to Broadstone. A football "special" from Shillelagh to Harcourt St. (D. and S.E. section) recently, was worked by G.S. and W. 0-6-0 No. 197, piloting D. and S.E. 2-4-0 tender locomotive No. 422 (old No. 24). D. and S.E. rebuilt 0-6-0 locomotives Nos. 440 and 441. They are stationed at Wexford, and usually work the 7 a.m. freight, Enniscorthy to North Wall, on alternate days. D. and S.E. 2-4-2T No. 29 has gone to Inchicore for repairs. Some of the Cavan and Leitrim Light Railway locomotives have been repaired at Broadstone and returned to their own section. These locomotives were conveyed to and from the works in boiler trucks.—[J. J. KENNEDY.]

A Woolwich-purchased 2-6-0 is now working on the Cork to Rosslare boat express. Two new engines of the "500" class have appeared, Nos. 501 and 502. Several tank engines formerly belonging to the C.B. and S.C.R. have been rebuilt with the standard G.S.R. chimney. A former M.G.W.R. Co.'s 0-6-0 was observed at Inchicore works. Two engines, Nos. 308 large boiler 4-4-0 and 356, a 2-6-0, were observed at Thurles engine shed, having their reversing and coupling rods painted red.—["TELESCOPE."]

G.N. of I. large 4-4-0, "170" class locomotives are frequently seen on the Belfast-Clones section. They also work on the Belfast-Derry (via Omagh) service.—[J. J. KENNEDY.]

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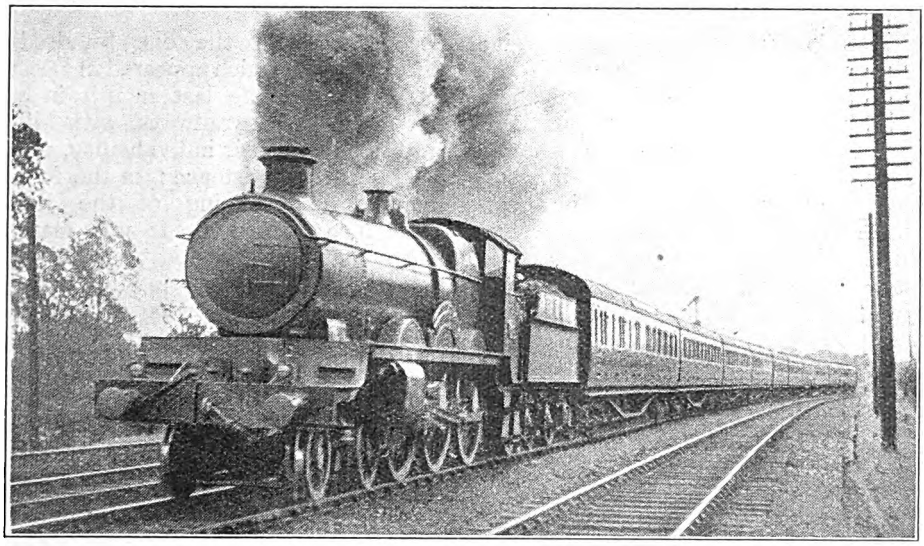

Photo.] DOWN BIRMINGHAM TWO-HOUR EXPRESS, G.W.R. [*W. L. Good.*
4-Cylinder 4-6-0 Engine No. 4000 "North Star."

British Locomotive Practice and Performance.

MR. CECIL J. ALLEN'S TWO-HUNDREDTH CONTRIBUTION.

IT seems almost impossible to realise that I have been responsible for the conduct of "British Locomotive Practice and Performance" over a space of something like seventeen years. When, rather over eight years ago, I sat down to write the one-hundredth article of the series, I wondered idly whether it would fall to my lot to pass the second "century" as well, and now the time has come for the two-hundredth to be set down on paper. The record of the late Mr. Charles Rous-Marten, who commenced the series in 1901, and continued over some 81 issues, had been beaten when I passed the 100 "mile-post," but it would require a very lengthy non-stop journey in his train to arouse more interest in this fascinating subject than was awakened by his facile pen, backed up by his wide experience. He has now "passed on"; his last article, indeed, appeared posthumously; another worthy—Rev. W. J. Scott—who helped for a short time to continue the articles after Mr. Rous-Marten's death, is also no longer with us. Happily, however, of the two others who had a brief share in keeping the subject under review, Mr. J. F. Gairns is well-known to be the Editor of this magazine, and Mr. Charlewood, who immediately succeeded Mr. Rous-Marten, still maintains a close connection with the subject, and is one of my most valued correspondents.

It was in June, 1906, that my first article was contributed to THE RAILWAY MAGAZINE, and in August, 1909, that my first essay appeared under the familiar caption which still adorns the head of these articles. For eighteen months mine was a quarterly contribution, turn-and-turn-about with Rev. W. J. Scott and Mr. J. F. Gairns; then, in January, 1911, I took over the entire responsibility for "British Locomotive Practice and Performance," which has continued without a break during the sixteen years between that date and this. Few of the many letters

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that I receive from correspondents give more pleasure than those in which the writers confess to having followed these articles unweariedly throughout this lengthy span, and aver that, although we may never have met personally, and although we may not always be in agreement, they have come gradually to regard me in the light of a personal friend. It is this feeling of writing, month by month, to a wide circle of friends, rather than to so many impersonal "readers," that has, perhaps, been the greatest of all encouragements, and has helped me to wield, in some degree at least, "the pen of a ready writer."

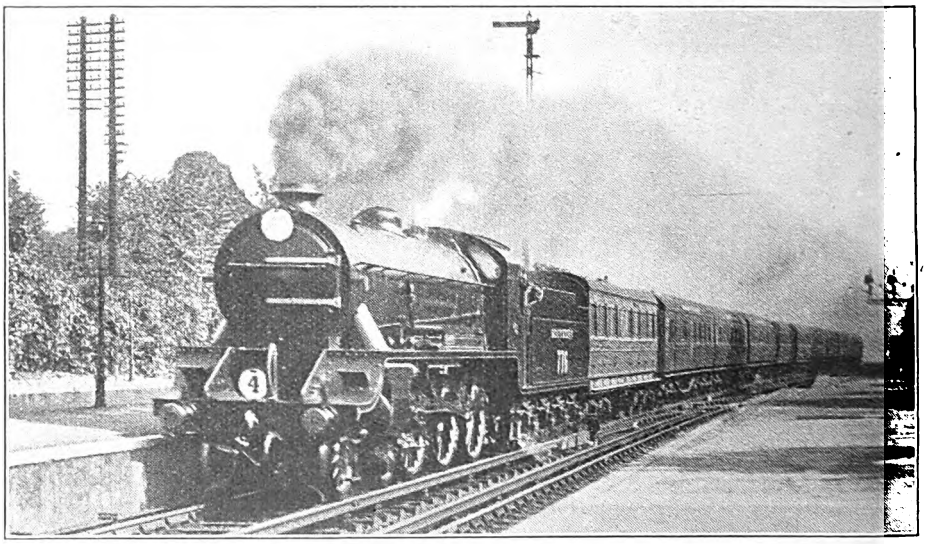

Photo.] [*F. R. Hebron.*

DOWN "ATLANTIC COAST" EXPRESS PASSING SURBITON, S.R.
4-6-0 No. 776E "Sir Galagars" ("King Arthur" class).

It is a singular coincidence that history has divided these 200 articles in four exactly equal periods, each of momentous importance to the railways of Great Britain. My fiftieth article, in August, 1914, marked the entry of this country into the Great War, the taking over of our railways by the Government, and the beginning of a period of great difficulty in the operation of our train services. The hundredth article, in October, 1918, synchronised with the last month of the war, when our express trains had fallen to the lowest ebb in the matter of scheduled speeds that they had known for many decades. Then the one hundred-and-fiftieth article, which appeared in December 1922, marked the last month in which our great British railways, with all their traditions and their individuality, retained their separate existence; in the following month the grouping of the railways came into operation. It was feared by many that this, the most epoch-marking of all the changes, in its effect on the railways, would, owing to the gradual imposition of standard conditions throughout each group, deprive the railway-running enthusiast of most of the basis of his enthusiasm, in the relative performance of the engines of the many different main lines. As I ventured to foreshadow at the time, however, this has not been the case; rather has an entirely new vista of interest opened up, in the inter-section working of many of our best-known express locomotive types over sections of line to which previously they had been strangers.

Further, the recent orientation of railway group publicity towards the fascinating sides of railway working, and especially the wonder of the modern locomotive and all that pertains to it, has been productive of a substantial increase, rather than a decrease, in our national appreci

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ion of how locomotives acquit themselves n the road. No longer is any mention f exceptionally high railway speeds, for xample, frowned upon in official quarters, s it was when the late Charles Rous-Marten kept locked within his breast hroughout his lifetime the fact that the reat Western 4-4-0 *City of Truro* had btained 102 miles an hour during the escent of Wellington bank, in the racing f 1904. To-day the railway which has ecorded a ninety-mile-an-hour speed loses o time in making the fact public, and a ew and thrilling race of another order, n the production of the "most powerful

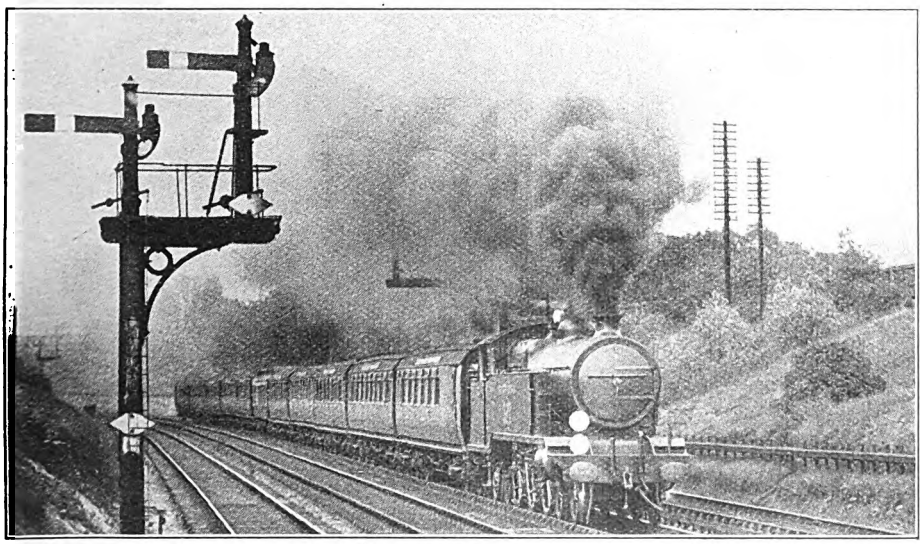

Photo.] [*O. J. Morris.*

DOWN "CITY LIMITED" ASCENDING NEW CROSS BANK, CENTRAL SECTION, S.R.
"Brighton" 4-6-4 Express Tank, No. 327B.

assenger locomotive in Great Britain," ids fair to proceed by annual "heats" or some time to come. Thus, although ny 200th article does not mark any otable change in British railway con-litions, as did the 50th, 100th and 150th, t does at least come at a time when public nterest in our railways, largely developed y the excellent work of their publicity officers, has reached a level previously unattained.

Apart from these general considerations owever, there is no doubt that British locomotive design and running does exercise a fashion over its devotees that no other country in the world could parallel. Precisely why this should be it is difficult to say; it is probably a product of various factors in combination. There is, first of all, individuality of locomotive outline, far removed from the "family likeness" which so often characterises the engines of other countries, as witness for example, the vast difference in external appearance between a Great Western "Castle" and a "Pacific" of the L.N.E.R. There are also the distinctive liveries of our British engines, beautifully finished and, in general, well maintained, and although the war and grouping between them have robbed us of some of the most entertaining of them, such as Caledonian and Great Eastern blue, Brighton and North British brown, and others, yet the neatness and finish of the British locomotive is still hard to beat, and is in itself an inspiring source of attraction. Direct competition between the famous railways of past days, too, reacting on the sporting temperament of our nation, has produced that peculiarly partisan interest in the doings of British railways which one might travel far to match, either abroad or in America.

Most remarkable of all, perhaps, is the

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hold that the fascination of the British railway continues to exercise over those who once were able to satisfy their enthusiasms with immediate contact, but since, by reason of leaving these shores for foreign parts, have had to content themselves, in order to maintain touch, with the meagre substitute of the printed page. To this fact my post-bag, during the course of one single year, would bear eloquent testimony. There is scarcely one single corner of the habitable globe that has not been represented, during the years that I have conducted these articles, by letters from far-away readers followed with the greatest interest and profit by his readers.

It is not possible, I know, to please everybody. The most frequent source of complaint is, perhaps, that some particular railway or stretch of line is getting neglected in my narrations of locomotive performance. But I would like to explain to some of my younger readers that travel in my case—contrary, perhaps, to their own ideas in the matter—is governed chiefly by business considerations, so that, for reasons over which I have no immediate control, some routes are bound to suffer a certain amount of

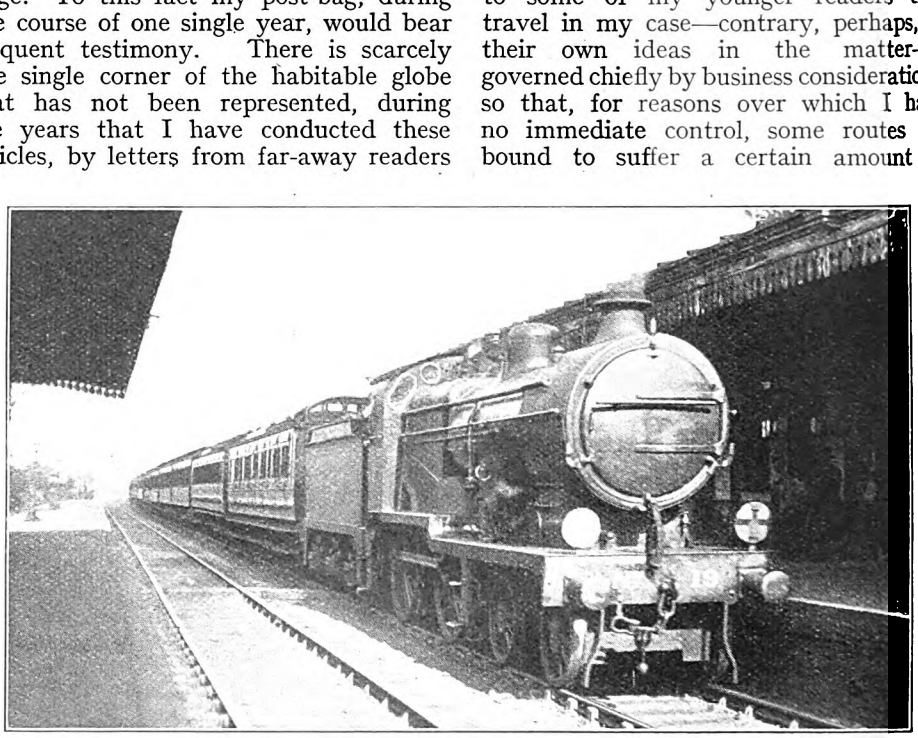

Photo.] [*H. Gordon Tidey.*

DOWN CONTINENTAL EXPRESS PASSING SYDENHAM HILL, EASTERN SECTION, S.R.

S.E. & C. rebuilt 4-4-0 No. 19.

commenting upon their subject matter. It is my only regret that extreme pressure of business, which increases rather than diminishes as the years pass, absolutely forbids my replying personally to these and many other communications, save when it is possible to include comments upon them or replies to them in the articles themselves. But every writer may take it as certain that his letter has been read with keen enjoyment by the recipient, whose ideas for forthcoming articles are to a large extent moulded by the indications which he receives in this correspondence, as to the subjects which will be

neglect from time to time. Over other routes it may so happen that running is much below normal standards for a time, and rather than give any false impression of locomotive ability I find it better temporarily to divert the attention of readers elsewhere. Topical subjects, like the advent of new locomotive types, require, too, to be dealt with from time to time, regardless of any plans that I may have made in advance to deal with other lines or routes. For these reasons it is impossible to scheme out "British Locomotive Practice and Performance" on hard-and-fast lines, giving exactly so

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much space to the performance of each group, section or locomotive type, as readers have sometimes suggested and even planned for me; in the nature of things the plan must be more or less haphazard, determined by the circumstances of the moment. For all that, I can claim that there is hardly a section of railway in the British Isles, over which express train running is performed, that has not figured in these articles since they came under my control.

In this connection it is perhaps, opportune to remind readers that the purpose of these articles—or that portion of them which deals with the work of the locomotives—is not so much to give a survey of time-table observance or non-observance as to describe the general capabilities in running of our various locomotive types. I am often asked by readers why I fail to detail the running of engines on some particular train or service. Recently, for example, I was told that the South Wales services of the Great Western Railway have received scant attention for a long time past. The answer is simply that, to my mind—apart from the effort required in drawing the train out of the depths of the Severn Tunnel—the running needed on these trains is more than illustrated by the performance, with engines of identical types, of the Bristol two-hour trains, achieved at higher speeds and for a large proportion of the distance over the same course.

"But," continues the querist, "you have not even given us any Bristol two-hour running for a long time, either." No, that is true. For the maximum effort required in the working of Bristol two-hour trains is itself more than covered by the harder demands of the West of England service, and yet more still by those of the Birmingham two-hour trains, the recent feats on both of which have been, in my judgment, of such note as to demand for their description the whole of the space that I could afford for Great Western Railway doings. This is not to say that runs on South Wales expresses will never appear here. I have now by me notes of a lengthy series, largely on the 8.55 a.m. and 7.55 p.m. Fishguard expresses out of Paddington, which between them combine to demonstrate how it is possible to overload even a Great Western 4-6-0, if nothing but a two-cylinder engine be ever provided for so formidable

Photo.] [*H. Gordon Tidey.*

MIDDAY SCOTCH EXPRESS LEAVING CARLISLE, L.M.S.R.
L.N.W. "Claughton" class 4-cylinder 4-6-0 No. 2416.

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a duty. Some time, no doubt, I shall find it possible to deal with these runs.

From the foregoing it will be clear to readers that not all the runs that are timed in the course of my journeys find their way into these columns. Far from it. In the period of eight years and four months which has elapsed between the 100th and the 200th of these articles, I have travelled by rail just over 380,000 miles, making, incidentally, a total of approximately 765,000 miles in my lifetime. It is impossible to refrain, too, from another "aside," and that is the tribute to the marvellous safety of British

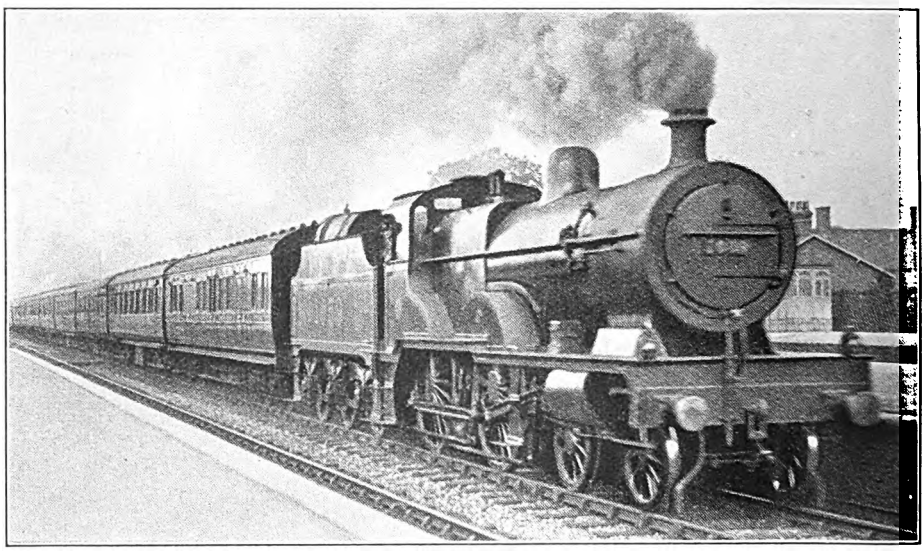

Photo.] UP SCOTCH EXPRESS, L.M.S.R. [*F. R. Hebron.*

Midland Division oil-burning 3-cylinder 4-4-0 compound No. 1059.

travel which is witnessed to by the fact that, in over three-quarters of a million miles of running, the vast majority of which has been in British trains, no train in which I have yet travelled has been involved in any accident worse than the breaking of a coupling between coaches.

To resume the argument, however, it is obvious that only a proportion of such a mileage can, in the necessary limitations of space, find description in these columns. From time to time, too, details of journeys recorded by correspondents are reproduced, especially when they cover railways or routes which are, for the time being, beyond my reach. Frequently, too, I include them for comparison with my own records. But here, again, no hard-and-fast rule can be laid down as to the runs selected for reproduction. Some recorders, alas! put themselves out of court altogether because glaring impossibilities in their times or speeds throw serious doubt on the accuracy of the whole record; other logs are useless because of the scantiness of their details; yet others have to be put on one side because the figures that I desire are hidden in a wealth of prose comment so diffuse that time does not permit me to search for them. Most readers now submit their figures in the tabular form to which they have become accustomed in the articles, and this is much the simplest to follow I would only add that readers who send their logs to me should confine themselves, generally speaking, to runs in which some exceptional features of running have been exhibited, as in my own travelling I see enough and to spare of the "ordinary" aspects of express train running. As has been previously mentioned, also, particulars of meritorious performance over routes which seldom figure in these columns are always welcome.

Train-timing has its moments of humour as well as of interest, some of which from

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time to time I have passed on to you to read. Perhaps the most diverting of all these happenings during the period under review occurred when I was making one of a series of journeys on the 6.5 p.m. express from Euston to Manchester. One evening the restaurant-car conductor approached me, and told me that after my exit from the car on the previous Monday my *vis-a-vis* had been greatly exercised to know for what purpose I was "timing the dinner"! *O sancta simplicitas*!

This has been, I fear, an excessively personal introduction to the performance

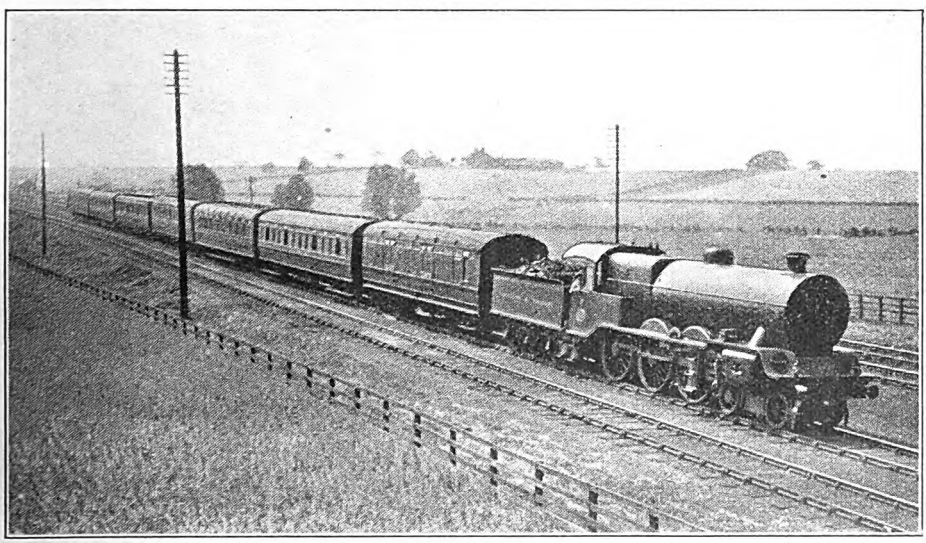

Photo.] [*J. F. Dearden.*

LIVERPOOL-NEWCASTLE EXPRESS NEAR COPMANTHORPE, L.N.E.R.

L.M.S. (L. & Y. Section) 4-cylinder 4-6-0 No. 1506.

section of the article, but the occasion may perhaps be regarded as the warrant. I have also been glad to take the opportunity of outlining the general purpose and policy of these articles, which need to be recapitulated from time to time as fresh coteries of readers arise to study them. To the many readers who have written me from time to time—the number of letters I now receive, bearing on the subject, varies from 30 to 50 a month—and to whom, for reasons already given, I have found it quite impossible to reply personally, I should like to express my warm appreciation of their courtesy, together with the hope that the conduct of this one-sided correspondence has proved as interesting to the writers as it has to the recipient. In order that readers may be certain in future that their letters have actually reached me, with the Editor's agreement, I propose to give at the close of each article a list of those from whom, during the month prior to writing the article concerned, I have received correspondence; those who do not desire their names published should add to their signature a *nom-de-plume*. Readers will, however, understand that early attention is not always possible to the matters they may desire to be discussed; and in any case, by the normal exigencies of publication, from one to two months must elapse between the receipt of their letters and this acknowledgment.

And now the time has come to direct our attention to locomotive performance. Following the precedent set in the one-hundredth article I propose to recapitulate what have been, in my judgment, the most meritorious feats of locomotive running that I have recorded on my journeys during the intervening period. On the last occasion these runs took place over many different railways; this time we have

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to deal with the corresponding sections of our four great groups. The task of selection has been, as previously, one of extraordinary difficulty, and it is quite possible that my final choice, after taking into consideration every possible factor bearing on the running, may not agree with the ideas of those readers who are sufficiently conversant with these factors to make a selection for themselves. Be that as it may, the runs about to be reproduced form a collective tribute to British locomotive design and performance which, in proportion to the size, weight and power of all the locomotives concerned, probably could not be paralleled in any other country in the world. In general I have thought it better to confine myself to my own journeys, although it is possible that certain of the correspondents' runs which have appeared during this period have been superior in character to those now to be dealt with.

Let me add one final word of caution. These are, in practically all cases, exceptional runs. Some of them are so exceptional in character as to be in the nature of phenomena. It would not be possible to take *any* engine of the same class, on any day, in any weather, with any fuel, any driver and any fireman and reproduce such feats. In most cases these runs represent the ideal performance of the locomotive type concerned, with the engine itself in perfect order, satisfactory weather conditions, good fuel and a supremely competent crew—a conjunction which is all too seldom experienced in these parlous post-war days.

In describing the runs I will follow the same method as in October, 1918, when I based the sequence of runs upon the order followed by Bradshaw's Guide. Then, as now, the Great Western Railway enjoyed the premier place, and the choice of a railway with which to open a series of this character could hardly be more suitable.

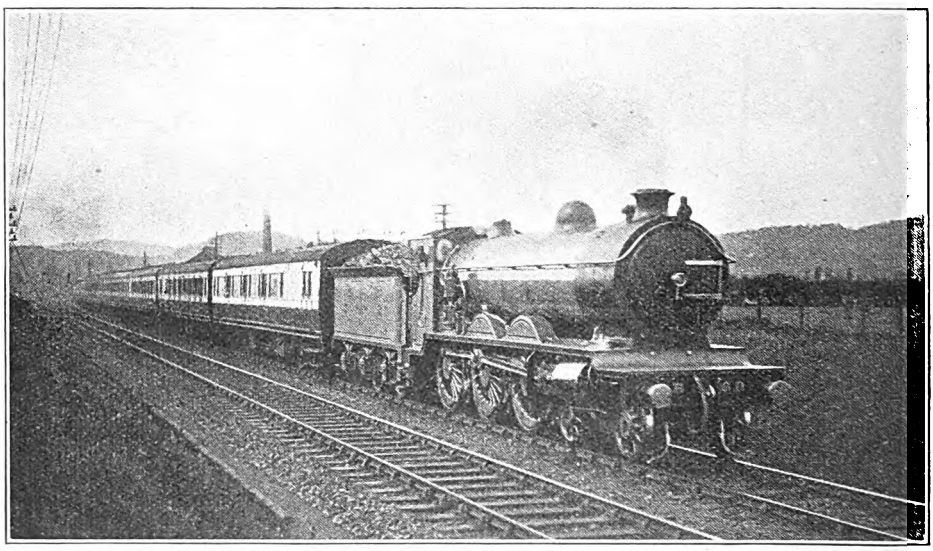

Photo.] [*H. L. Salmon.*

ABERDEEN-GLASGOW EXPRESS, L.M.S.R., NEAR STIRLING.
Caledonian 4-6-0 locomotive No. 60.

The best of my Great Western runs was not made by a "Castle," but by *Princess Sophia* on the 12 noon from Birmingham to Paddington. One would hardly imagine that a "Star" could have any margin in hand on the up two-hour schedule with a load of nearly 400 tons, which No. 4055 brought up from Leamington, but we succeeded in keeping time, despite two severe signal checks; in fact, after losing 2½ min. by a bad check at Ashendon, we were actually 1¾ min.

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TABLE 1.

GREAT WESTERN RAILWAY.
12 NOON BIRMINGHAM—PADDINGTON.

Engine: 4-cyl. 4-6-0, No. 4055, *Princess Sophia.*
Load to Leamington: 301 tons empty, 315 tons full.
Load from Leamington: 359 tons empty, 380 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Birmingham ..	0	0 00	—
3·2	Tyseley ..	—	5 15	—
7·0	Solihull ..	—	9 15	—
10·4	Knowle ..	—	12 30	—
12·9	Lapworth ..	—	14 35	80½
17·1	Hatton	19	17 55	67
21·3	Warwick ..	—	21 20	77½
23·3	Leamington ..	26	23 40	—
6·1	Southam Road	—	9 50	46
11·1	Fenny Compton	—	15 20	—
16·2	Cropredy ..	—	20 25	77½
19·8	Banbury ..	22	23 15	80½
24·9	Aynho Junc. ..	27	27 15	75
30·1	Ardley	—	31 55	60
33·9	Bicester.. ..	—	35 00	86½
39·9	Brill	—	39 20	71½
			sigs.	
43·1	Ashendon Jc. ..	44	43 20	—
47·2	Haddenham ..	—	48 20	—
52·6	Princes Risborough ..	54	54 20	43½
55·8	Saunderton ..	—	58 20	67
58·5	West Wycombe	—	60 55	—
60·8	High Wycombe	63	63 15	35*
65·6	Beaconsfield ..	—	69 05	—
69·9	Gerrard's Cross	—	73 10	—
72·5	Denham ..	—	75 10	85
77·0	Northolt Junc...	79	78 25	—
79·5	Greenford ..	81	80 10	83½
82·7	Park Royal ..	—	82 35	—
84·0	Old Oak Common West Jc.	86	84 15	30*
			sigs.	
87·3	Paddington ..	91	90 45	—

Net time, Leamington—Paddington, 87 min.
* Service slack.

ahead of time on passing Old Oak. Four times was the "eighty" line crossed on this wonderful journey, and the average speed of 75·2 m.p.h. from Cropredy to Brill, with its minimum of exactly 60 m.p.h. at Ardley Summit, not to mention the average of 81·7 m.p.h. over 12·8 miles from Gerrard's Cross to Park Royal, one might go for years without equalling with such a load. So the total time gained by engine was 6¼ min., and on such times Birmingham to Paddington might be run non-stop in 109 min.

The run in Table 2 is one of the only two that I have included timed by other recorders than myself. I had no really "best" effort over the level stretches of the Great Western Railway, and one could hardly go through the achievements of eight years without a mention of this truly startling feat. Another "Princess" was concerned this time — *Princess Patricia*—and contrived to maintain an average rate of 75·1 m.p.h. continuously over the 67·3 miles from Shrivenham to Acton, 78·1 over the 35.6 miles from Shrivenham to Reading, and no less than 81 over the 10·8 miles from Challow to Didcot. From start to stop the average rate of travel was just above 70 m.p.h.—70·06, to be precise—and that the driver should have found it practicable to convert a late start of 4¾ min. from Swindon into

TABLE 2.

GREAT WESTERN RAILWAY.
3.45 P.M. SWINDON—PADDINGTON.

Engine: 4-cyl. 4-6-0, No. 4059, *Princess Patricia.*
Load: 212 tons empty, 235 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Swindon ..	0	0 00	—
5·7	Shrivenham ..	—	7 15	75
10·7	Uffington ..	—	11 15	75
13·4	Challow ..	—	13 12	80
16·9	Wantage Rd. ..	—	15 50	81
20·8	Steventon ..	—	18 40	82
24·2	Didcot	24	21 12	80
28·8	Cholsey ..	—	24 42	79
32·6	Goring	—	27 38	76½
35·8	Pangbourne ..	—	30 10	75½
38·7	Tilehurst ..	—	32 28	75
41·3	Reading ..	40	34 35	74
46·3	Twyford ..	45	38 45	71½
53·1	Maidenhead ..	50½	44 20	72
54·8	Taplow	—	45 50	72
58·8	Slough	55½	49 10	72
61·1	Langley.. ..	—	51 05	72
64·1	West Drayton ..	—	53 35	70½
66·4	Hayes	—	55 33	70½
68·2	Southall ..	64	57 05	70½
70·0	Hanwell ..	—	58 35	72
71·6	Ealing	—	59 52	74
73·0	Acton	—	61·00	74
76·0	Westbourne Pk.	—	63 40	—
77·3	Paddington ..	75	66 12	—

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Photo.] [*Lt. A. D. McKechnie.*

3.45 P.M. FROM INVERNESS TO PERTH ASCENDING CULLODEN BANK, L.M.S.R.

Hauled by two 4-6-0 "Castle" type locomotives of the Highland Section.

an arrival 4 min. early at Paddington, on the fastest start-to-stop schedule in the world, was a striking tribute to the capabilities of the Swindon product. I should mention that close examination detected one or two minor errors in the intermediate times and speeds on this run, as originally published, but these have been corrected in Table 2.

The rapid advance in the quality of Southern locomotive performance is witnessed by the fact that two out of

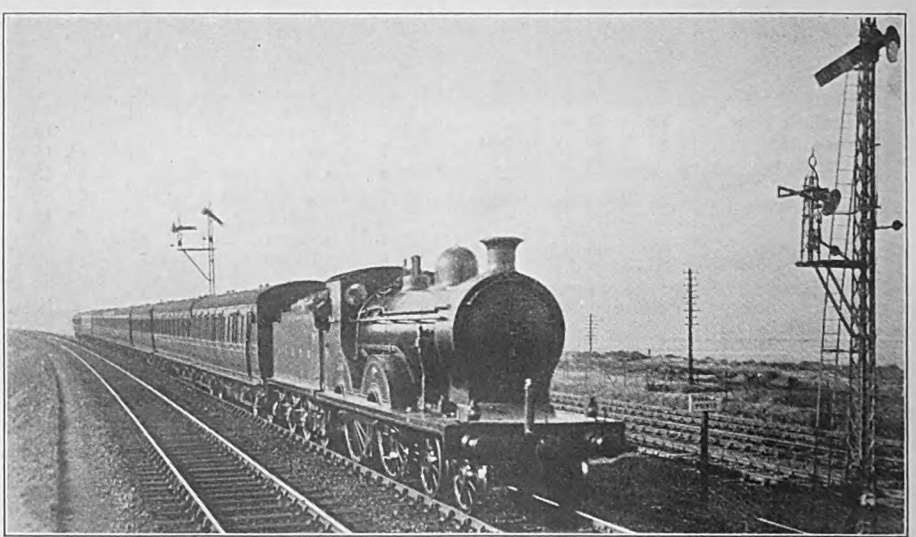

Photo.] [*J. W. Kerr.*

8.25 A.M. AYR-GLASGOW PULLMAN BREAKFAST CAR EXPRESS NEAR BARASSIE, L.M.S.R.

G. & S.W. Section 4-4-0 No. 340.

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TABLE 3.

SOUTHERN RLY. (L.S.W. SECTION)
12.30 P.M. EXETER—SALISBURY.

Engine: 2-cyl. 4–6–0, No. 747, *Elaine*.
Load: 44 axles, 330 tons tare, 350 tons full.

Distance.		Actual.	Speeds.
miles.		m. s.	m.p.h.
0·0	Exeter	0 00	—
1·1	Exmouth Junc. ..	3 25	—
2·9	Pinhoe	5 50	—
4·8	Broad Clyst	7 30	71½
8 5	Whimple	11 05	52
10·4	Mile-post 161¼ ..	13 30	41½
12·2	Sidmouth Junc. ..	15 50	—
13·5	Mile-post 158	17 15	64½
16·8	Honiton	21 25	34
18·0	Mile-post 153½ ..	23 35	31
23·7	Seaton Junc.	29 10	90
27·0	Axminster	31 30	76½
32·1	Chard Junc.	36 20	56½
38·5	Mile-post 133	44 15	43
40·1	Crewkerne	45 55	80½
43·6	Hardington Box ..	48 45	76½
45·3	Mile-post 126¼ ..	50 15	61
46·7	Sutton Binghan ..	51 35	70½
48·9	Yeovil Junc.	53 25	77½
		—	67
53·5	Sherborne	57 25	71½
56·4	Mile-post 115¼ ..	61 10	31½
57·2	Milborne Port ..	62 30	—
		sigs.	—
59·6	Templecombe*	65 45	—
		70 10	—
61·0	Mile-post 110½ ..	—	60
64·0	,, 107½ ..	76 20	42½
66·3	Gillingham	78 45	68
70·4	Semley	83 45	36½
74·5	Tisbury	88 55	67
78·8	Dinton	92 45	71½
84·5	Wilton	97 55	70½
88·0	Salisbury	101 35	—

Net time: 93 mins.
* Signal stop.

my three Southern "bests" are of quite recent occurrence, and have not previously figured in these columns. It was on the up "Atlantic Coast Express" that *Elaine* put up the magnificent running figuring in Table 3 which, incidentally, gave me the first "ninety" that I have ever recorded on any part of the Southern line. Such a figure is not, perhaps, difficult of achievement on a falling grade of 1 in 80; but the point of this journey was that the uphill work was on just as high a level. No lower minimum rate than 41½ m.p.h. up the 5 miles at 1 in 170-100 to mile-post 161¼, nor than 31 up the 4½ miles continuously at 1 in 100-90 to the mouth of Honiton Tunnel, were noteworthy with 350 tons behind the tender. The 35·5 miles from Honiton Summit over Hewish Summit to Sherborne had been covered in 33 min. 50 sec., when there came the disastrous check at Templecombe, which kept us standing for 4½ min., after a long preliminary slowing. From the magnificent sprint our driver made from Templecombe to Salisbury, I calculate that we should have passed Gillingham in just over 78 min., and reached Salisbury in 93 min., or 3 min. under the fastest schedule that has ever operated from Exeter to Salisbury. I may have timed *King Arthur* efforts equal to this, but not, I think, any to beat it.

During the past years I have timed no outstanding effort on the old Brighton line, but the run reproduced in Table 4 certainly brought me the nearest to "even time" from a dead start that I have ever recorded on that section of the Southern Railway, as we passed Earlswood, 29 miles from Brighton, in 29 min. 50 sec.

TABLE 4.

SOUTHERN RLY. (L.B. & S.C. SECTION)

Engine: 4–6–4 Tank No. 328; Driver: Green.
Load: 38 axles, 225 tons tare, 240 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Brighton ..	0	0 00	—
1·3	Preston Park ..	—	3 35	35½
4·7	Clayton S. End	—	8 15	48½
7·0	Hassocks ..	—	10 35	71½
9·7	Keymer Junc. ..	13	12 45	75
12·9	Hayward's Hth.	—	15 25	70½
16·8	Balcombe ..	—	19 00	62½
19·0	Tunnel Box ..	—	21 10	58½
21·3	Three Bridges ..	25	23 20	—
24·9	Horley	—	26 15	77½
29·0	Earlswood ..	—	29 50	61½
32·1	Quarry Box ..	36	33 20	—
34·0	Star Lane Box..	—	35 40	45
35·9	Coulsdon ..	40	37 40	—
37·3	Purley	—	39 00	67
40 4	East Croydon ..	45	41 45	40*
41·5	Selhurst ..	—	43 30	—
46·6	Balham Junc. ..	52	49 10	—
48·2	Clapham Junc...	55	51 55	—
51·0	Victoria.. ..	60	58 25	—

* Service slack.

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TABLE 5.

SOUTHERN RLY. (S.E. & C. SECTION)
5.10 P.M. FOLKESTONE—CHARING CROSS.

Engine: New 4–4–0, No. 758; Driver: Harris.
Load: 40 axles, 308 tons tare, 340 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Folkestone C. ..	0	0 00	—
0·7	Shorncliffe ..	—	2 10	—
1·8	Cheriton Junc...	—	4 10	38
4·6	Sandling Junc...	7	7 45	48½
5·9	Westenhanger ..	—	9 15	53
9·6	Smeeth	—	12 50	70½
13·9	Ashford ..	16	16 20	76½
			—	68
19·5	Pluckley ..	—	21 10	74
24·8	Headcorn ..	—	25·30	76½
28·1	Staplehurst ..	29	28 10	71½
30·6	Marden ..	—	30 10	68
35·2	Paddock Wood	36	34 10	72½
			—	58½†
40·5	Tonbridge ..	41	39 40	33*
43·1	Hildenborough	—	43 45	40
45·0	Weald Box ..	—	47 00	36
48·0	Sevenoaks ..	53	51 55	36‡
49·5	Dunton Green ..	—	53 35	61½
50·8	Polhill Box ..	—	54 55	55½
53·5	Knockholt ..	59	58 25	42
			p.w.s.	30
56·2	Orpington ..	62	61 55	64
58·8	Chislehurst ..	64½	64 25	60*
61·1	Grove Park ..	—	66 25	71½
62·9	Hither Green	68	68 05	60*
65·1	New Cross ..	71	70 50	48*
			sigs.	30
68 2	London Bridge	75	75 00	25*
70·0	Charing Cross ..	80	79 10	—

Net time: 77¾ mins.
* Service slack.
† At summit of rise before Tonbridge.
‡ On leaving Sevenoaks Tunnel.

performances, in proportion to the size of the engine, recorded in this article. One of the latest Maunsell 4-4-0 engines—No. 758—was concerned, and despite the tremendous load for one of these 80-minute Folkestone bookings, of 340 tons, actually improved on "even time" from the start to passing Tonbridge. Never before have I noted even the exact observance of the 41-minute booking to this point, let alone an improvement on it by over 1¼ min. It was achieved by an acceleration to all but 50 m.p.h. up the continuous 1 in 264 from Folkestone to Sandling, followed by the electrifying time of 24 min. 55 sec. over the 29·3 miles from Westenhanger to Paddock Wood, with its average of 70·6 m.p.h., and two maxima of 76½ m.p.h. on the gentle undulations that mark this distance. Despite running of a somewhat easier character up to Knockholt Summit and beyond, with a couple of out-of-course slacks, we drew up in Charing Cross ¾-min. before time, having achieved a net time of 77¾ min., of which Driver Harris, of Dover—the responsible functionary on the footplate—had every reason to feel proud.

TABLE 6.

L.M.S. (L. & N.W. SECTION),
9.21 A.M. WILLESDEN—BIRMINGHAM.

Engine: 4–4–0 Superheated "Precursor," No. 7, *Titan*; Driver: Brightland.
Load: 26 axles, 180 tons tare; 190 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Willesden ..	0	0 00	—
2·7	Wembley ..	—	4 20	56½
6·0	Harrow ..	—	7 50	60
7·9	Hatch End ..	—	9 40	61
10·6	Bushey ..	—	12 15	—
12·1	Watford ..	14	13 35	70½
15·6	King's Langley	—	16 45	66
19·1	Boxmoor ..	—	19 55	65
22·6	Berkhamsted ..	—	23 10	62½
26·3	Tring	29	26 50	61½
30·7	Cheddington ..	—	30 30	83½
34·8	Leighton ..	—	33 30	80½
41·3	Bletchley ..	43	38 25	79
47·0	Wolverton ..	—	42 45	80½
49·4	Castlethorpe ..	—	44 40	75
			eased.	
54·5	Roade ..	55	49 50	52½
57·4	Blisworth ..	58	52 55	—
64·3	Weedon ..	—	59 45	—
69·9	Welton ..	—	65 25	—
			sigs.	5
77·2	Rugby ..	77	75 00	—
77·8	Rugby No. 7 Box ..	—	76 10	—
83·7	Brandon ..	—	82 10	66
88·6	Coventry ..	88	86 35	—
92·1	Tile Hill ..	—	90 20	56½
94·1	Berkswell ..	—	92 20	—
97·4	Hampton ..	—	95 20	74
101·0	Marston Green	—	98 20	—
103·7	Stechford ..	—	100 40	—
105·6	Adderley Park	—	102 35	—
			p.w.s.	
107·5	New Street ..	109	107 00	—

Net time: 102½ min.

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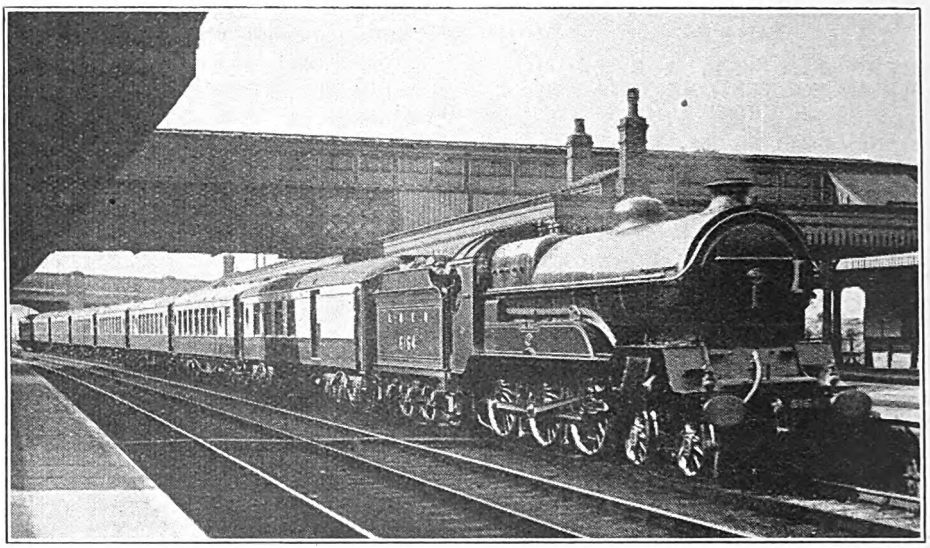

Photo.] [*F. R. Hebron.*

UP "WEST RIDING PULLMAN" PASSING WOOD GREEN, L.N.E.R.
G.C. Section 4-Cylinder 4-6-0 locomotive No. 6164 "Earl Beatty."

TABLE 7.

L.M.S. (L. & N.W. SECTION), RUGBY—CREWE.

Engine: 4–6–0, "Prince of Wales" type, No. 268.
Load: 60 axles, 421 tons tare; 450 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Rugby	0	0 00	—
5·5	Brinklow ..	—	9 00	—
8·8	Shilton	—	13 00	—
10·9	Bulkington ..	—	15 25	—
14·6	Nuneaton ..	17	18 55	67
19·8	Atherstone ..	—	23 55	61
23·9	Polesworth ..	—	27 40	67
27·4	Tamworth ..	31	30 55	—
33·7	Lichfield ..	—	37 10	—
38·4	Armitage ..	—	42 20	52
41·6	Rugeley ..	46	45 30	64½
44·5	Colwich ..	—	48 20	—
46·9	Milford	—	50 40	60
51·0	Stafford	57	55 05	40*
54·3	Great Bridgeford	—	59 10	—
56·3	Norton Bridge	64	61 30	—
60·9	Standon Bridge	—	67 00	—
65·0	Whitmore ..	—	71 40	50
67·5	Madeley ..	—	74 35	—
70·7	Betley Road ..	—	77 35	69
75·5	Crewe	87	83 20	—

* Service slack.

The London Midland and Scottish Railway now demands attention. Of heavily-loaded journeys that I have observed on the Western Division none made a greater impression on me than the trip detailed in Table 7, where a Beardmore "Prince" is seen engaged in hauling a load which, inclusive of its tender, represents some 7½ times its own weight, and 61 tons above the present specified maximum loading for this type. Yet, after an initial loss of 2 min. from Rugby to Nuneaton, we gained time steadily, finally reaching Crewe 3¾ min. early. All but 60 miles from Bulkington to Betley Road were covered with 450 tons in 62 min. 10 sec., despite the Stafford slack.

And then, as an example of lightly-loaded high-speed running, what could serve the purpose better than Driver Brightland's joyous exhibition on the 9.10 a.m. out of Euston, seen in Table 6. Our average speed of 77·7 m.p.h. on this occasion over the 23·1 miles from Tring to Castlethorpe, with its sustained maximum of over 80 m.p.h. down 1 in 330, was no more remarkable than the attainment of 61 m.p.h. up the same grade from Willesden, and the maintenance of a minimum of 61½ an hour over Tring Summit. I have little doubt that this

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TABLE 8.

L.M.S. (MIDLAND DIVISION)
6.7 P.M. LEICESTER—ST. PANCRAS.

Engine : 3-cyl, 4–4–0 compound, No. 1036.
Load : 37 axles, 227 tons tare ; 240 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Leicester ..	0	0 00	—
3·7	Wigston ..	—	6 40	—
7·5	Great Glen ..	—	11 10	53
10·2	Kibworth ..	—	14 00	54
12·8	East Langton ..	—	16 15	77½
16·1	Mkt. Harborough	20	19 10	50*
20·6	Desborough North Box ..	—	25 25	42½
23·5	Glendon ..	—	28 15	80½
27·1	Kettering	32	31 35	—
0·0	Kettering	0	0 00	—
			p.w.s.	25
2·7	Isham	—	4 55	—
3·8	Finedon ..	—	6 35	—
7·0	Wellingborough	8	10 00	65
9·3	Irchester ..	—	12 20	—
12·3	Mile-post 59¾ ..	15	15 55	43½
15·3	Sharnbrook ..	—	19 00	82
19·1	Oakley	—	21 50	71½
22·3	Bedford	24	24 30	74
30·3	Ampthill ..	—	32 25	50
31·8	Flitwick ..	—	34 15	57½
34·7	Harlington ..	—	37 35	47½
39·2	Leagrave ..	—	43 15	—
41·8	Luton	46	45 40	68
44·8	Chiltern Green	—	48 30	—
47·4	Harpenden ..	—	50 55	—
52·1	St. Alban's ..	56	55 10	72½
56·8	Radlett ..	—	58 50	80½
59·6	Elstree ..	—	61 30	58½
62·7	Mill Hill ..	—	64 20	—
65·1	Hendon ..	68	66 15	76½
66·9	Cricklewood ..	—	67 50	—
68·5	Finchley Road	—	69 25	—
70·5	Kentish Town ..	74	71 35	—
72·0	St. Pancras ..	77	74 25	—

Net time, Kettering—St. Pancras, 72½ min.
* Service slack.

superheated "Precursor" could have run the 107½ miles from Willesden to Birmingham in under 100 min., given a clear road, and a continuance of the initial effort.

The run representing the Midland Division, in Table 8, is not, perhaps, equal in merit to some of the special compound test efforts which have figured in these columns of recent years, but as a specimen of the first-class day-to-day work which may often be recorded on Midland metals, it ranks high. It was made on the morning Edinburgh-St. Pancras express, before the diversion of that train *via* Nottingham, and it is notable that the gross time from Leicester to London, including the Kettering stop and subsequent slack, was only 107 min., equal to the best non-stop up schedule of to-day. Save between Market Harborough and Wellingborough time was gained on every section, and the maxima included three "eighties" and three speeds between 74 and 77½ m.p.h., at well separated locations—a remarkable "bag" in one journey of under 100 miles in length. An unchecked non-stop journey from Leicester, on these times, would have been completed in 101½ min. for the 99 miles, over this heavily-graded route.

Consideration of the times and speeds in Table 9 may excite surprise at the inclusion of such a run as this among my "bests," but only to those unfamiliar

TABLE 9.

L.M.S. (L. & Y. DIVISION)
4.25 P.M. SALFORD—COLNE.

Engine : 2–4–2 Tank, No. 1532 ; Driver : Turner.
†Load : 40 axles, 229 tons tare ; 255 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Salford	0	0 00	—
1·7	Pendleton ..	—	4 10	45½
4·0	Clifton Junc. ..	7	7 30	40*
6·3	Ringley Rd. ..	—	11 30	34
8·1	Radcliffe N. Jc.	—	13 40	55
			sigs.	40
9·9	Bury	17	15 55	45
12·5	Summerseat ..	—	19 30	41
13·9	Ramsbottom ..	23	21 40	39
			sigs.	33
14·6	Stubbins Junc...	—	22 45	39
16·7	Helmshore ..	—	26 45	29
18·6	Haslingden ..	—	30 55	29½
20·0	Baxenden ..	—	33 30	28½
22·2	Accrington (slip)	40	37 25	10*
23·8	Huncoat ..	—	40 25	—
25·3	Hapton ..	—	42 05	57
26·8	Rose Grove ..	46	43 45	45*
27·8	Burnley ..	49	45 55	—

Net time, 45 min.
* Service slack.
† 32 axles, 200 tons full, from Accrington.

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with the extreme difficulty of the course over which they were achieved. From the start the first 20 miles are almost unbrokenly upwards, including 2½ miles at 1 in 96 from Clifton Junction to Ringley Road, and then, after an easier length to a point 11 miles from the start, 1 in 132 from there to Ramsbottom, and a fearsome culmination at 1 in 78 from Stubbins Junction for 5 miles right up to Baxenden Summit—a nice proposition for a 2-4-2 tank engine hauling 255 tons! How brilliantly Driver Turner succeeded is evident in the table; even during the steepest part of the journey the little engine cheerfully maintained a speed only just under the 30 m.p.h. level, gaining time steadily until an arrival was effected at Burnley Barracks over 3 min. early. To-day the same train is hauled by the vastly larger and more powerful four-cylinder 4-6-4 tank engines designed by Mr. Hughes for the Lancashire and Yorkshire section.

The Caledonian section of the L.M.S. is the only one of the railways of pre-grouping days which is not represented in this article by one of its pre-grouping locomotives. But I have no run with a Caledonian engine, during the period under review, which will compare with my recent journeys behind Midland compounds. One of these, of outstanding merit, appeared last month; but this run, in consideration of the load, appears to me to have been the finer of the two. Readers were reminded last month that the start from Carlisle to Beattock includes all but 16 miles adversely inclined at 1 in 193-200; and yet this 60-ton locomotive gamely completed the first 39·7 miles of the journey in a start-to-stop time of 45 min. 5 sec. Net times on this journey just about make up the 127-minute Carlisle-Glasgow booking of the old 2 p.m. out of Euston, when the 73-ton 4-6-0 *Cardean* had a nightly load of about 40 tons less than this.

There is no "record" attaching to the Glasgow and South Western journey in Table 11; it is about my best G. and S.W. trip, although merely a log of the most heavily-loaded run that I have timed on the 5.10 p.m. 50-minute express from Glasgow to Ayr, when good, but hardly exceptional work was performed. The tank engine's best achievement was to cover the 15 miles

TABLE 10.

L.M.S. (CALEDONIAN SECTION)
7.46 P.M., CARLISLE—GLASGOW.

Engine: 4-4-0 Midland compound, No. 1140.
Load: 48 axles, 330 tons tare, 345 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Carlisle	0	0 00	—
4·1	Rockcliffe ..	—	6 45	—
6·1	Floriston ..	—	8 50	65
8·6	Gretna	11	11 15	—
13·0	Kirkpatrick ..	—	16 25	45
16·7	Kirtlebridge ..	21	20 55	60
20·1	Ecclefechan ..	—	24 35	—
22·7	Castlemilk Box	—	27 35	49
25·8	Lockerbie ..	30	30 35	65
28·7	Nethercleugh ..	—	33 15	68
31·7	Dinwoodie ..	—	36 05	—
34·5	Wamphray ..	—	38 45	68
39·7	Beattock	45	45 05	—
0·0	Beattock	0	0 00	—
5·5	Greskine Box ..	—	11 30	34
8·0	Harthope Box	—	15 55	32½
10·0	Summit ..	20	19 35	33
12·9	Elvanfoot ..	—	22 45	71½
15·6	Crawford ..	—	25 10	72½
18·1	Abington ..	—	27 20	66
23·5	Lamington ..	—	32 10	69
27·2	Symington ..	37	35 45	55½
28·8	Thankerton ..	—	37 15	71½
30·3	Leggatfoot Box	—	38 35	65
33·5	Strawfrank Jc.	—	41 25	72½
33·8	Carstairs	45	42 25	—
0·0	Carstairs	0	0 00	—
2·8	Cleghorn ..	3	5 30	—
7·2	Braidwood ..	—	10 15	64½
10·6	Law Junc. ..	13	13 45	40
			sigs.	20
16·0	Motherwell ..	21	20 55	—
20·3	Uddingston ..	27	26 00	—
22·2	Newton ..	29	28 05	—
27·8	Eglinton St. ..	36	35 05	—
28·8	Glasgow ..	40	37 30	—

Net time, Carstairs—Glasgow, 36½ min.

from Dalry to Prestwick, with this 325-ton load, in 15 min. 10 sec.

The London and North Eastern Railway now claims attention. If my own opinion be sought as to the most extraordinary feat of running in the whole of this article it is the miraculous achievement of Great Northern "Atlantic" No. 4452, detailed in Table No. 12. Until I actually recorded it I should have held that "Atlantic" timekeeping on such schedules with a load of 450 tons from Doncaster

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TABLE 11.

L.M.S. (G. & S.W. SECTION),

5.10 P.M. GLASGOW—AYR.

Engine: 4–6–4 Tank, No. 540.
Load: 42 axles, 304 tons tare, 325 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Glasgow ..	0	0 00	—
1·6	Shields Road ..	3	4 30	—
4·2	Cardonald ..	—	7 50	49
7·7	Paisley (G. St.)	10	12 00	40*
9·7	Elderslie ..	12	14 50	—
10·9	Johnstone ..	14	16 20	50
13·8	Howwood ..	—	19 55	50
16·5	Lochside ..	—	23 00	56½
18·6	Beith	24	25 15	56½
23·3	Dalry	29	30 10	55
26·8	Kilwinning ..	33	33 50	60
29·1	Bogside ..	—	36 05	64
30·2	Irvine	37	37 10	60
32·1	Gailes	—	39 05	61½
34·9	Troon (Goods) ..	42	41 50	60
37·4	Monkton ..	—	44 20	61
38·3	Prestwick ..	—	45 20	—
			p.w.s.	30
40·2	Newton ..	—	48 15	—
41·4	Ayr	50	50 15	—

Net time, 49 min.
* Service slack.

TABLE 12.

L.N.E.R. (G.N. SECTION),

10.51 A.M. DONCASTER—KING'S CROSS.

Engine: 4–4–2, No. 4452; Driver: Codd.
Load to Grantham: 58 axles, 422 tons tare, 450 tons full.
Load from Grantham: 64 axles, 458 tons tare, 490 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Doncaster ..	0	0 00	—
4·7	Rossington ..	—	7 50	53½
6·5	Piper's Wood Box	—	10 05	48
8·3	Bawtry	—	12 00	69
12·1	Ranskill ..	—	15 25	—
16·4	Canal Box ..	—	19 30	—
17·4	Retford ..	21	21 10	—
4·9	Markham Box ..	—	9 00	40½
6·7	Tuxford ..	—	11 05	—
12·2	Carlton	—	15 50	75
18·5	Newark ..	21	21 15	—
23·2	Claypole ..	—	25 45	60
27·1	Hougham ..	—	29 55	52
28·9	Barkstone ..	—	32 10	42½
33·1	Grantham ..	38	38 10	49½
5·4	Stoke Box ..	—	10 30	38
8·4	Corby	—	14 00	—
13·3	Little Bytham	—	18 10	77½
16·9	Essendine ..	—	20 55	77½
20·7	Tallington ..	—	24 00	—
23·6	Helpston Box ..	—	26 30	71½
26·0	Werrington Jc.	—	28 40	66
29·1	Peterborough ..	33	32 30	—
3·8	Yaxley	—	6 55	—
7·0	Holme	—	10 10	61½
12·9	Abbot's Ripton	—	16 40	44
14·4	Leys Box ..	—	18 35	—
17·5	Huntingdon ..	20	21 45	70½
20·4	Offord ..	—	24 20	—
24·7	St. Neot's ..	—	28 25	56½
28·9	Tempsford ..	—	32 40	64½
32·3	Sandy	—	36 00	—
35 3	Biggleswade ..	—	39 10	—
39·4	Arlesey	—	43 45	—
40·7	Three Counties	—	45 10	—
44·5	Hitchin ..	48	49 25	—
47·8	Stevenage ..	—	54 00	45
51·4	Knebworth ..	—	58 10	—
54·4	Welwyn ..	—	61 40	—
58·7	Hatfield ..	64	65 35	70½
63·7	Potter's Bar ..	—	70 50	54
67·2	New Barnet ..	—	74 25	—
71·4	Wood Green ..	—	78 05	70½
73·8	Finsbury Park	—	80 35	—
76·4	King's Cross ..	84	84 40	—

to Grantham, and all but 500 tons from there to King's Cross, was an utter impossibility. Yet, on arrival in London Driver Codd had but a modest ½-minute to book against his engine. Every single detail of the running on this memorable day repays close examination, and the fact may well be noted that this was no brief spurt, but a sustained effort for 156 miles continuously. Most notable of the times were possibly the uphill starts from Retford to Markham and from Grantham to Stoke; in the latter case there was an acceleration up 1 in 200 to no less than 38 m.p.h., an extraordinary figure for a 69½-ton engine, with 36 tons adhesion, pulling 7½ times its own weight. But I dare not stop to deal further with this amazing effort.

Little short of it in merit in all the circumstances, was Driver Chapman's running on the Great Eastern "Hook of Holland" boat express, which figures in Table 13. On this occasion I rode on the footplate, and a truly thrilling experience it was, as I detailed at the time. The run I reproduced in the December issue with the same driver and train, slightly

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TABLE 13.

L.N.E.R. (G.E. SECTION),
8.30 P.M. LIVERPOOL ST.—PARKESTON QUAY.

Engine: 4–6–0, No. 8566; Driver: Chapman.
Load: 59 axles, 388 tons empty, 415 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Liverpool St. ..	0	0 00	—
1·1	Bethnal Green Junc. ..	—	3 25	—
4·0	Stratford ..	8	7 50	35*
7·3	Ilford	—	11 55	—
10·0	Chadwell Heath	15	14 50	55
12·4	Romford ..	—	17 25	54
15·0	Harold Wood ..	—	20 15 sigs.	55
18·2	Brentwood ..	—	24 25	—
19·3	Ingrave Box ..	—	26 25	27
20·2	Shenfield ..	28	27 40	—
23·6	Ingatestone ..	—	31 00	—
28·9	Crompton's Box	—	35 40	71½
29·7	Chelmsford ..	38	36 30	55*
32·1	New Hall Box ..	—	39 00	—
35·9	Hatfield Peverel	—	42 50	—
38 6	Witham ..	48	45 35	66
42·3	Kelvedon ..	—	49 10	60
44·1	Hill House Box	—	51 00	54
46·6	Mark's Tey ..	—	53 40	62½
50·4	Lexden Box ..	—	57 05	70½
51·7	Colchester ..	61	58 25	50*
54·1	Parson's Heath Box ..	—	61 10	45
56·0	Ardleigh ..	—	63 35	—
59·5	Manningtree ..	70	67 20	25*
61·2	Mistley	—	70 15	—
65·1	Wrabness ..	—	75 20	—
68·9	Parkeston Quay	82	80 15	—

Net time, 79½ min.
* Service slack.

continued indefinitely at the same speed. But Chapman there thought it well somewhat to ease his steed; even then a further minute was gained on the desperately hard booking from Chelmsford to Manningtree by this 64-ton engine.

To represent the Great Central section I have no journey of really exceptional merit, although the running of *Butler-Henderson* on the 4.48 p.m. from Leicester to Marylebone, concluding a through locomotive working of 206 miles, was certainly very fine. In particular, to mount the long 1 in 176 past Ashby with no greater drop in speed than from 55½ to 50 m.p.h., deserves notice, and, again, the minimum of 44½ m.p.h. up the lengthy 1 in 117 past Wendover was a remarkable feat. That the net time for the 103 miles was no more than 3 min. under schedule is a tribute to the onerous character of this booking; this net time, however, might have been cut further to 105 min., given the considerably higher speeds customary over Grendon Junction and from Amersham down to Rickmansworth. I should regard this run as slightly superior to the equally loaded Midland run in Table 8,

TABLE 14.

L.N.E.R. (G.C. SECTION)
4.48 P.M. LEICESTER—MARYLEBONE.

Engine: 4–4–0, No. 5506, *Butler-Henderson*.
Load: 24 axles, 218 tons tare, 230 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Leicester ..	0	0 00	—
4·7	Whetstone ..	—	7 00	55½
9·2	Ashby ..	—	12 15	50
13·1	Lutterworth ..	—	16 20	69
—	Shawell ..	—	—	80½
19·9	Rugby ..	—	22 10	68
24·6	Braunston ..	—	26 10	75
31·6	Charwelton ..	—	34 05	44
34·0	Woodford ..	37	36 45	70½
37·0	Culworth ..	—	39 20	61½
40·6	Helmdon ..	—	42 55	69
			—	64
43·8	Brackley ..	—	45 45	74
			—	77½
48·6	Finmere ..	—	50 45	40†
			—	74
54·3	Calvert ..	—	56 00	66
			—	70½
56·3	Grendon Jc. ..	—	57 45	60*
58.7	Quainton Rd. Junc. ..	59	60 20	47*
65·1	Aylesbury ..	66	66 50	66
67·4	Stoke Mandeville ..	—	69 10	53½
69·8	Wendover ..	—	72 15	46
—	Dutchlands ..	—	76 00	44½
74·3	Gt. Missenden	—	77 35	76½
79·5	Amersham ..	—	82 20	57
81·5	Chalfont Rd. ..	—	84 20	—
83·7	Chorley Wood	—	86 20	—
85·9	Rickmansworth	89	88 55	20*
89·4	Northwood ..	—	94 00	—
91·7	Pinner ..	—	96 30	—
			p.w.s.	—
93·9	Harrow ..	98	99 35	
98·3	Neasden Junc.	102	104 20	—
103·1	Marylebone ..	110	111 20	—

Net time: 107 min.
* Service slack.
† p.w. slack through station (severe).

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TABLE 15.

L.N.E.R. (N.E. SECTION),
7.31 P.M. GRANTHAM—YORK.

Engine: 3-cyl. 4–4–2, No. 721;
Driver: Redfern.
Load: 38 axles, 264 tons tare, 280 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Grantham ..	0	0 00	—
4·2	Barkstone ..	—	6 40	69
6·0	Hougham ..	—	8 10	75
9·9	Claypole ..	—	11 20	70½
14·6	Newark ..	16	15 15	77½
20·9	Carlton	—	20 20	72½
21·9	Crow Park ..	—	21 10	71½
25·8	Dukeries Junc.	—	24 55	59
26·4	Tuxford	—	25 30	61½
28·2	Markham Box ..	—	27 20	59
30·0	Grimston Box ..	—	29 00	67
33·1	Retford ..	36	32 00	55*
36·2	Sutton	—	35·05	70½
38·4	Ranskill ..	—	37 00	71½
40·3	Scrooby	—	38·35	75
42·2	Bawtry	—	40 10	—
44·0	Piper's Wood Box ..	—	41 50	61½
45·8	Rossington ..	—	43 30	70½
50·5	Doncaster ..	54	47 30	—
54·7	Shaftholme Jc.	59	51·25	—
57·5	Moss	—	54 10	64
60·5	Balne	—	56 55	68
61·8	Heck	—	58 05	67
64·3	Templehirst ..	—	60 15	71½
68·9	Selby	77	65 05	30*
73·0	Riccall	—	70 40 sigs.	57½ stop.
82·4	York (Loco. Yd.)	93†	86 25	—

Net time, Grantham—York (Station): 82 min.
* Service slack. † Booked passing time.

with which it closely compares, in view of the greater grading difficulty of the Great Central route, not to mention the service slacks at Quainton Road, Rickmansworth and Harrow.

The two runs representing the North Eastern area of the L.N.E.R. were really one, on the 5.30 p.m. express from King's Cross to Newcastle, the North Eastern engine booked to haul the train from Grantham (in the summer) non-stop to Darlington having to be changed for another of the same type at York, owing to the development of a slight defect. On this particular occasion the net running time from King's Cross to Darlington, inclusive of the usual 4-min. stop at Grantham, was 4 hours for the 232·3 miles, or 23 min. less than schedule. No. 721 achieved the fastest time by far that I have ever recorded personally from Grantham to Selby, where schedule time had been cut by 12 min., and that despite an unusually cautious passage of Retford. This, however, was balanced by exceptionally high speed through Doncaster. From Barkstone to Templehirst our average speed for 60·1 miles was 67·4 m.p.h.

Then, from York, although No. 2172 was not booked to leave until 9.30 p.m.—which explains her comparatively leisurely start, owing to unpreparedness—Driver Hardgrave put up some wonderful work, covering the 31·8 miles from Tollerton to Croft Spa in 27 min. 25 sec., at an average speed of almost exactly 70 m.p.h., against the generally rising tendency of the road. Incidentally he beat all my records in the north-bound direction of running over this racing course, by attaining a speed of 76½ m.p.h. beyond Danby Wiske.

The running of North British "Atlantic" No. 9875, in Table 17, may pall somewhat by comparison with these immediately preceding feats, but it was no mean

TABLE 16.

L.N.E.R. (N.E. SECTION).

Engine: 3-cyl. 4–4–2, No. 2172;
Driver: Hardgrave.
Load: 38 axles, 264 tons tare, 280 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	York	0*	0 00	—
1·6	Poppleton Junc.	3	4 20	—
5·5	Beningbrough ..	—	9 20	57½
9·7	Tollerton ..	—	13 25	67
11·2	Alne	14	14 45	68
13·4	Raskelf	—	16 40	69
16·1	Pilmoor ..	—	19 10	69
18·0	Sessay	—	20 50	70½
22·2	Thirsk ..	26	24 25	72½
26·5	Otterington ..	—	28 05	71½
29·9	Northallerton ..	34	31 05	70½
33·7	Danby Wiske ..	—	34 20	76½
37·2	Cowton ..	—	37 10	—
38·9	Eryholme ..	42	38 40	69
41·5	Croft Spa ..	—	40 50	77½
44·1	Darlington ..	49	44 15	—

* Booked passing time.

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TABLE 17.

L.N.E.R. (N.B. SECTION),
9.26 P.M. DUNDEE—EDINBURGH.

Engine: 4–4–2, No. 9875, *Midlothian*.
Load: 56 axles, 364 tons tare, 390 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Dundee ..	0	0 00	—
0·7	Esplanade ..	—	3 05	23
2·7	Tay Bridge S. ..	8	7 55	37½
4·6	St. Fort.. ..	—	10 35	62½
			—	52½
8·3	Leuchars Junc.	14	14 35	60½
11·6	Dairsie	—	18 35	44½
13·6	Cupar	—	22 05	55½
16·9	Springfield ..	—	25 10	39
20·1	Ladybank Jc. ..	28	29 35	50½
23·0	Falkland Rd. ..	—	34 15	28½
24·3	Lochmuir Smt.	—	37 05	37½
25·9	Markinch ..	—	39 25	63
28·5	Thornton Jc. ..	39	41 55	—
			p.w.s.	35
30·2	Mile-post 29 (St.)	—	44 45	34
33·3	Kirkcaldy ..	—	48 15	66
36·4	Kinghorn ..	—	51 20	60
39·0	Burntisland ..	52	54 20	45*
41·8	Aberdour ..	—	58 15	—
43·2	Dalgetty Smt. ..	—	61 10	28½
				60
46·0	Inverkeithing ..	62	64 45	35*
48·0	Forth Bridge N.	66	68 35	23
49·7	Dalmeny ..	69	71 50	—
52·7	Turnhouse ..	—	75 30	61½
55·7	Saughton ..	—	78 50	—
58·0	Haymarket ..	80	81 10	—
59·2	Edinburgh (W.)	83	84 00	—

Net time, 83 min. * Service slack.

achievement, for all that. Here, again, intimate knowledge of the exceedingly difficult running conditions of this part of the East Coast route, with its long and steep switchback grades and many slacks, is necessary before any appreciation is possible of the task of hauling a 390-ton train from Dundee to Edinburgh on this schedule. Suffice it to say that, from the start out of Dundee up 1 in 68, past the climbs to Lochmuir, mile-post 29, Dalgetty, and, last and most fearsome of all, the 2 miles at 1 in 70 from the severe Inverkeithing slack up to the Forth Bridge, *Midlothian* appeared to be going "all out" for most of the journey, downhill stretches alone excluded. At any rate, I consider myself justified in selecting this as my best North British journey during the period under review.

And now, although this is not strictly "British" locomotive performance, the tale would not be complete without some reference to the locomotive running of the Emerald Isle. The journey on the Great

TABLE 18.

G.N.R. (IRELAND),
3.0 P.M. DUBLIN—BELFAST.

Engine: 4–4–0, No. 172, *Carrantuohill*.
†Load: 36 axles, 288 tons tare, 305 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h
0·0	Dublin	0	0 00	—
1·6	Clontarf ..	—	4 25	—
4·8	Howth Junc. ..	10	9 00	60
6·8	Portmarnock ..	—	10 55	62½
9·0	Malahide ..	—	13 10	57
13·9	Rush & Lusk ..	—	18 10	64½
16·0	Mile-post 16 ..	—	21 05	43½
18·0	Skerries ..	—	23 25	61
21·7	Balbriggan ..	—	27 00	61
24·0	Gormanstown ..	—	29 35	—
27·1	Laytown ..	—	32 40	—
31·8	Drogheda ..	36	38 05	30*
37·2	Mile-post 37¼ ..	—	46 05	43
41·8	Dunleer ..	—	50 35	64½
47·1	Castlebellingham	—	55 15	74
52·0	Mile-post 52 ..	—	59 50	50½
			sigs.	
54·3	Dundalk ..	64	63 30	—
0·0		0	0 00	
3·8	Mount Pleasant	—	7 40	—
5·3	Mile-post 59½ ..	—	10 45	29
8·3	Adavoyle ..	—	16 10	33
				49
11·3	Mile-post 65½ ..	—	20 20	43½
15·0	Bessbrook ..	—	24 10	67
17·6	Goraghwood ..	27	26 40	60*
19·5	Mile-post 73¾ ..	—	28 20	66
22·6	Poyntzpass ..	—	32 10	35*
25·4	Scarva	—	35 40	—
27·8	Tanderagee ..	—	38 20	58½
33·4	Portadown ..	47	45 35	—
5·0	Lurgan ..	—	8·00	54
8·4	Mile-post 96 ..	—	11 50	51½
10·5	Moira	12	13 55	66
14·8	Maze	—	18 05	—
17·4	Lisburn ..	21	20 35	60
20·9	Dunmurry ..	—	24 05	60
22·6	Balmoral ..	—	25 50	—
24·9	Belfast ..	30	29 40	—

Load: 275 tons from Drogheda (slip), 240 tons from Dundalk, 170 tons from Goraghwood (slip) and 260 tons from Portadown.
* Service slack.

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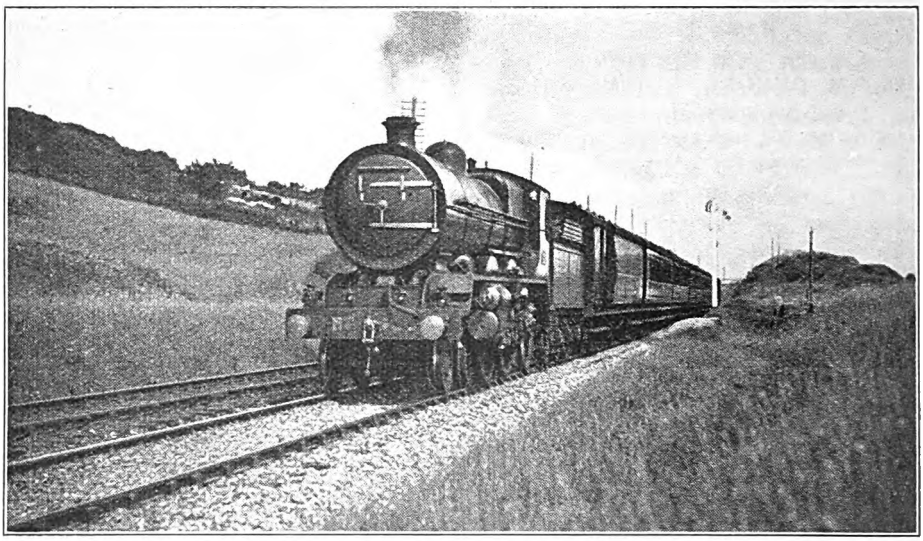

Photo.] [*Rex. Murphy.*

UP ENGLISH MAIL NEAR RATHPEACON, GREAT SOUTHERN RAILWAYS (IRELAND).
4-Cylinder 4-6-0 locomotive No. 404.

Northern Railway, in Table 18, is but little more than normally occurs on that enterprising line, *Carrantuohill* having roughly 3 min. in hand on the Dublin-Belfast booking of the heavily-loaded 3 p.m. northbound express. The hardest work of the journey, of course, occurs in the climb northwards out of Dundalk; mile-post 59½ marks the top of 3¾ miles at 1 in 100, after which follow 6 miles up continuously at 1 in 109-142, save for the ½-mile drop after Adavoyle. Apart from this "peak," and the 1 in 177 ascent from Drogheda to mile-post 37¼, the route has nothing worse than undulations at fairly easy grades, over which, as will be seen, average speeds ruled throughout at round about the mile-a-minute rate.

The Great Southern Railways figure in a really brilliant effort that I was fortunate to catch on the Great Southern and Western section in the early years of the war, when the rebuilt but not superheated 4-4-0 No. 332, with a train of no less than 300 tons weight, succeeded in maintaining an average of 60 m.p.h. over a total of 56½ miles of the 86½ miles' journey from Thurles into Dublin, made up of the 32½ miles from mile-post 65¼ to Cherryville Junction, and the 24 miles from Newbridge to Inchicore. As will be seen, No. 332 succeeded in gaining no less

TABLE 19.

GREAT SOUTHERN RLY. (IRELAND), 6.37 P.M. THURLES—DUBLIN

Engine: Rebuilt 4–4–0, No. 332.
Load: 36 axles, 286 tons tare, 300 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Thurles	0	0 00	—
3·7	Brittas Box ..	—	7 20	—
7·8	Templemore ..	—	13 30	—
14·0	Lisduff ..	—	21 50	43½
19·9	Ballybrophy ..	—	28 45	—
21·5	Mile-post 65¼ ..	—	30 35	43½
27·0	Mountrath ..	—	36 25	69
32·5	Mile-post 54¼ ..	—	41 55	50
35·5	Maryborough ..	—	45 40	64
38·8	Straboe Box ..	—	48 55	55
44·8	Portarlington ..	—	54 15	67
49·8	Monasterevan ..	—	59 00	67
54·0	Cherryville Jc.	—	63 30	—
56·5	Kildare	73	67 15	—
0·0	Kildare	0	0 00	—
4·5	Newbridge ..	—	7 50	—
9·0	Caragh Box ..	—	12 20	—
12·0	Sallins	—	15 25	64½
16·9	Straffan.. ..	—	20 10	66
20·0	Hazlehatch ..	—	23 05	59
23·3	Lucan	—	26 25	—
25·5	Clondalkin ..	—	28 45	68
28·5	Inchicore ..	—	31 30	—
30·0	Kingsbridge ..	37	34 00	—

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than $8\frac{3}{4}$ min. on schedule time between Thurles and Dublin.

Still less germane to the strict subject matter of these articles, perhaps, is the running over the Northern Railway of France, but it has been made the subject of such frequent reference during the past year or so that I cannot refrain from concluding with details of a run, for which I am indebted to a correspondent, on the recently instituted "Golden Arrow" express.

TABLE 20.

CHEMIN DE FER DU NORD
11.55 A.M. "GOLDEN ARROW" EXPRESS, PARIS—CALAIS.

Engine: 4–6–2 4-cyl. compound, No. 3.1218.
Load: 44 axles, Pullman Stock, 501 tons tare, 515 tons full.

Distance.		Times.
miles.		m. s.
0·0	Paris	0 00
3·8	St. Denis	6 00
9·2	Villiers-le-Bel	11 25
14·6	Louvres	17 10
18·5	Survilliers	21 10
		sigs.
25·4	Chantilly	28 30
		sigs.
31·3	Creil	35 10
33·7	Laigneville	37 50
40·5	Clermont	44 30
45·2	Avréchy	49 10
49·4	St. Just	53 25
54·2	Gannes	58 30
69·0	Ailly-sur-Noye	71 00
78·3	Longueau	79 05
81·2	Amiens (severe slack) ..	82 40
87·0	Ailly-sur-Somme	89 50
89·9	Picquigny	92 20
94·2	Hangest	96 00
98·1	Longpré	99 20
103·6	Pont-Rémy	103 55
109·0	Abbeville (slack)	108 45
114·0	Port-le-Grand	113 30
117·4	Noyelles	116 45
126·8	Quend-Fort-Mahon	125 05
133·6	Rang-du-Fliers Verton ..	131 45
136·9	St. Josse	134 10
140·6	Etaples	137 25
145·2	Dannes-Camiers	141 40
148·7	Neufchâtel	145 50
		p.w.s.
154·3	Pont-de-Briques	152 55
—	Outreau Jc. (slack)	—
158·0	Boulogne (Tint.)	157 10
160·9	Wimille Wimereux	161 00
167·4	Marquise—Rinxent	167 15
172·5	Caffiers	174 25
178·1	Fréthun	179 55
182·3	Calais (Ville)	185 25
184·3	,, (Maritime)	189 10

Net time: 182–183 min.
Schedule time: 190 min.

The full load of 10 Pullmans and a bogie brake was carried, making with passengers and luggage 515 tons in all, and yet the 96-ton "Pacific" found no difficulty in recouping the loss occasioned by a series of signal checks and a p.w. check, and in reaching Calais nearly a minute early. With normal descents from Survilliers to Creil and from Neufchâtel to Boulogne, a time of between 182 and 183 min. would certainly have been achieved. That is to say, the net time, with 515 tons, was under "even time," despite the severe slowing through Amiens, other slacks at Creil, Abbeville and Boulogne, and the 8 miles up at 1 in 125 between the latter town and Caffiers Summit. Note the average speed of 58·1 m.p.h. from St. Denis to Survilliers, largely up at 1 in 200, and, again, of precisely 60 m.p.h. from Creil up to Gannes, corresponding to the ascent of our North Western main line to Tring; also mark the average rates on the level, of 70·6 from Ailly-sur-Somme to Pont Rémy, and of 66·8 m.p.h. from Port-le-Grand to Étaples, 43·2 miles in all. Surely no other locomotive work in Europe, no, not even in our own country, can quite equal such a staggering feat as this!

And yet it is tolerably clear, from the records which have made up a large part of this article, that Britain has, as yet, far from "shot her bolt" in the matter of railway speed. Against the reservation made at an earlier stage in regard to the ideal running conditions required to produce many of the runs which have been described, may be set the fact that Britain's largest and most powerful express types—the London and North Eastern "Pacifics," the Southern "Lord Nelson," the Great Western "Castles" and the L.M.S. "Claughtons"—have not so much as been represented at all in this article, so rarely are they allowed to demonstrate to the full their powers of speed and haulage.

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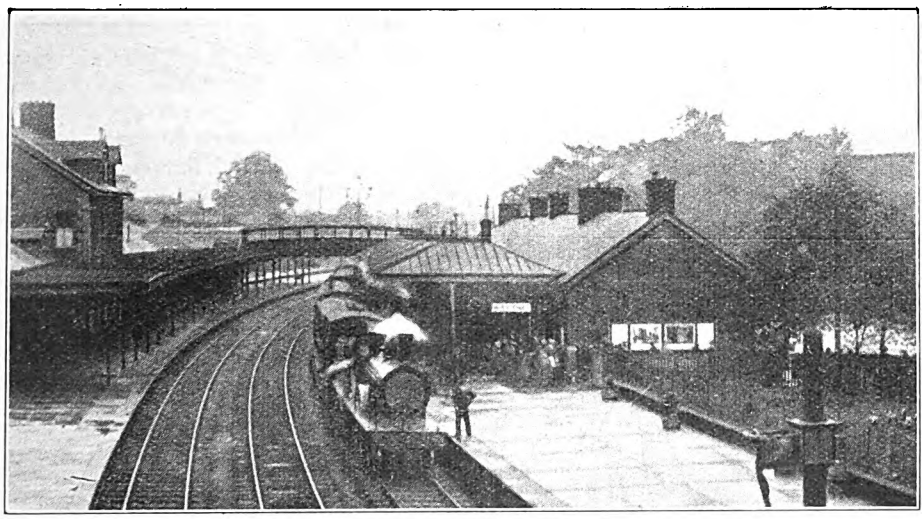

Photo.] GENERAL VIEW OF STATION. [*J. F. Gairns.*

Dumfries as a Railway Centre.

By J. ALAN RANNIE, M.A. (Oxon.).

THOUGH it contains only 17,000 inhabitants, Dumfries is the largest town of an extensive district in the south-west of Scotland, and the centre of a prosperous agricultural and residential area. It is also by no means unpicturesque in itself, and the beautiful scenery surrounding it, together with the interesting ruins of abbeys and castles within a few miles, attract a considerable number of tourists, especially during the summer months. It is a railway centre of very considerable importance, being the first important station north of the border on the Glasgow and South Western section of the London, Midland and Scottish Railway, and the junction of several branch lines, one of which is an important link in the communications between Great Britain and Ireland. This is the line to Stranraer, which connects with the "short sea route" to Larne and so to Belfast. Dumfries station is, in fact, sometimes referred to as the "Junction between England, Scotland and Ireland."

Travelling towards Dumfries from Carlisle there are several objects of interest to be observed en route. As far as Gretna Junction (8½ miles) the line formerly belonged to the Caledonian Railway, the Glasgow and South Western having running powers and its trains not calling at the intermediate stations of Rockcliffe and Floriston. Whilst passing the engine sheds at Kingmoor, we may notice that Glasgow and South Western engines are now accommodated there as well as their Caledonian sisters, whereas they formerly used a shed, now closed, on the Maryport line to the south of Carlisle station. The Waverley route, which crosses our line just beyond Kingmoor, remains in sight for a considerable distance to the north, the angle of divergence being at first very small. Rockcliffe station is now used as a halt, that is to say there is no staff, and tickets are not issued there. Between Rockcliffe and Floriston, a distance of two miles, there is an additional running line on each side. This widening was undertaken at a time when the traffic over this section was particularly heavy as a result of the War, and the establishment of the great munitions factory at Gretna. It was finished in 1919.

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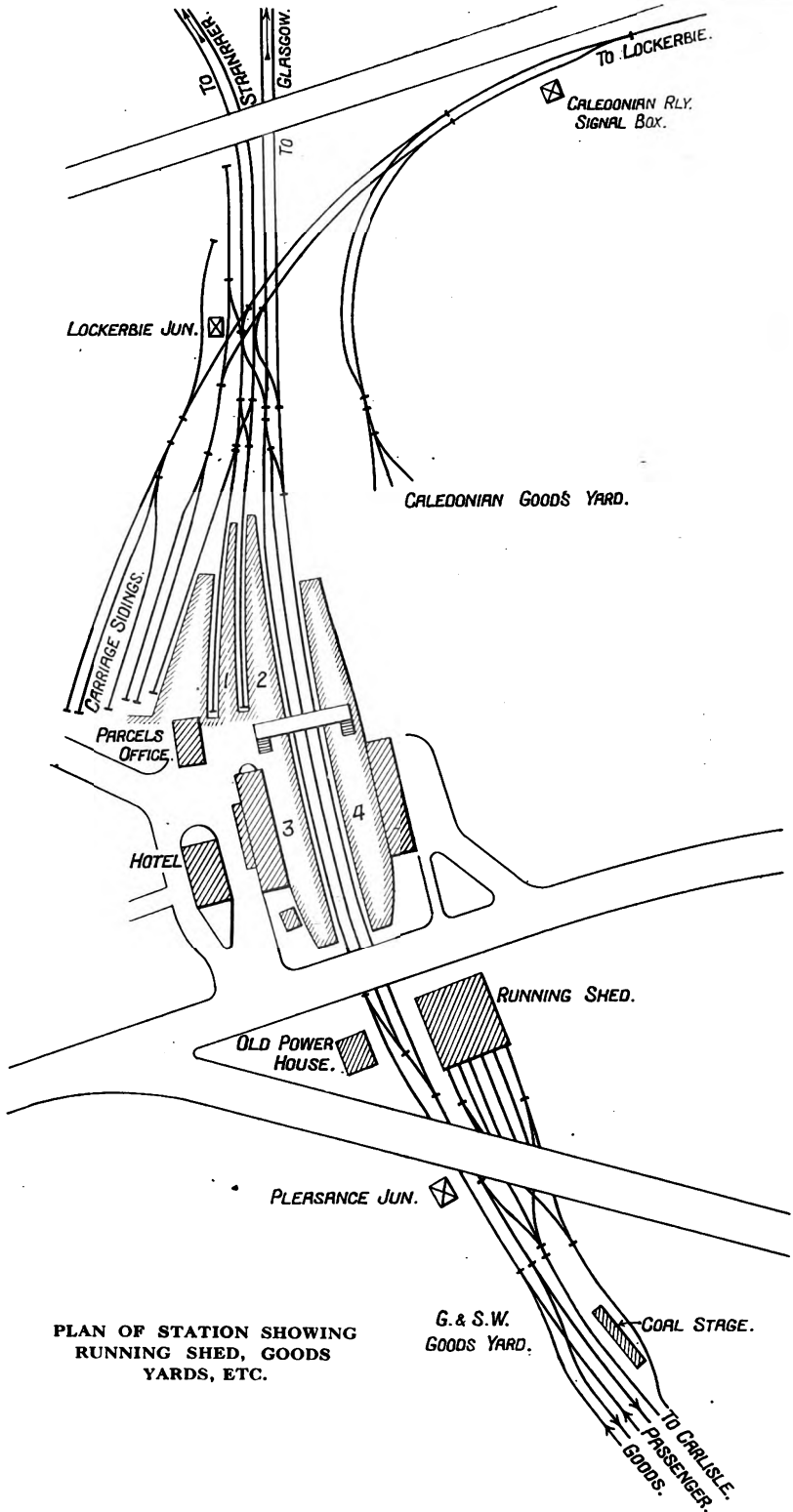

PLAN OF STATION SHOWING RUNNING SHED, GOODS YARDS, ETC.

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Passing Floriston, and crossing the Esk, we see the wide spreading remains of the Gretna factory, through the middle of which the now almost disused Gretna branch of the North British can be seen threading its way. It runs into a small terminus close to the station of the Caledonian line. Immediately beyond the platforms of Gretna station, we cross the border, which is here formed by a small river, the Sark, and the Caledonian and South Western lines at once divide, the former pursuing a more or less northerly course, whilst our route curves sharply to the west.

The country traversed, which has been quite flat all the way from Carlisle, continues to be of this character, but we now have the gleaming line of the Solway on our left, with beautiful views of Skiddaw and other mountains of the Lake District across the water. In front rises the fine outline of Criffel, an isolated hill about seven miles south-west of Dumfries, whilst to the right, various ranges of the Dumfriesshire hills are visible. Gretna Green, the first Glasgow and South Western station, is barely a mile from the junction. Here and at Eastriggs (the next station but one) the villages built in connection with the munitions factory can be seen ; in fact the name of the latter station was changed from Dornock to Eastriggs on account of the new village of that name. Approaching Annan (17½ miles from Carlisle) we get a glimpse of the long, low outline of the Solway Viaduct to the left, and the line leading to it crosses our route by an over-bridge just before we reach the station. There is a physical connection between the two lines. The Solway Junction Railway (as this branch of the Caledonian is called) is still in use from Kirtlebridge Junction on the main line to Annan, but is closed beyond, owing to the weakness of the Solway Viaduct. Annan is not a large town, but it is regarded as of sufficient importance for several of the Anglo-Scottish expresses to call there, either regularly or conditionally.

At Cummertrees, the next station, we are almost on the shores of the Solway, and Silloth, Maryport, and other Cumberland towns can be distinguished if the weather is clear. In the neighbourhood of Ruthwell there is a sharp undulation before the line descends again to sea level. The last stretch before reaching Dumfries traverses Lochar Moss, a picturesque but extremely boggy tract of country, which gave considerable difficulty to the engineers at the time of the construction of the line.

At Noble Hill Junction signal box we reach the beginning of Dumfries yard : from this point onwards there are separate goods lines to the west of the passenger roads for a distance of about a mile, as far as the south end of the passenger station. At Ramsay Place Junction, a little further on, we see to our left the very extensive goods station of the Glasgow and South Western section. Pleasance Junction Box succeeds, and controls the engine-shed lines and the south end of the station.

Dumfries passenger station is situated on a slight curve and is of singularly attractive design and appearance. The down platform is the original one and has towards its northern end a covered circulating area of ample extent, on which are the buffer stops of two single line bays, which open towards the north. The up platform, which was added subsequently, has glazed umbrella roofing supported by ornate iron columns between which are suspended baskets of flowers, whilst the space behind the railings at the south end of both platforms is pleasantly laid out with grass and shrubs. In addition to the two running lines there is a middle siding between the platforms, which is used for shunting and storing rolling-stock. The two sides of the station are connected by a covered-in foot-bridge but each of them is complete in itself, having a separate booking hall, bookstall, refreshment room, and carriage approach, as well as the usual waiting rooms, &c. On the down side are the parcels and telegraph offices and also a fruit stall, whilst the booking hall contained until recently a separate office for issuing tickets for the Caledonian trains, in addition to a large circular office for the Glasgow and South Western line. The station buildings, like most of the town of Dumfries, are built of red sandstone. There is a loading dock together with several carriage sidings to the north-west of the station. The platforms are numbered. No. 1 is the westernmost of the two bays. It is used for both the arrival and the departure of Caledonian trains, whilst No. 2 alongside is similarly employed for Kirkcudbright and Stranraer trains, though these sometimes arrive at

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the up main platform. No. 3 is the down main and is the only platform available for trains proceeding towards Glasgow or the Cairn Valley line. No. 4 is the up main platform, which has no bays and is used by all main line and Cairn Valley trains in the southward direction.

The station is equipped with telegraph-boards showing the running of trains—down trains reported from Carlisle and Annan; up trains from Kilmarnock and Sanquhar. The station, together with the extensive yards surrounding it, and the Station Hotel, has long been lighted by electricity. The railway company formerly had its own power station just south of draw water from the water columns on the platforms.

Lockerbie Junction signal box controls all movements at the north end of the station, and is the largest of the five signal cabins at Dumfries. It governs the junction of the main line with the Stranraer and Lockerbie branches, which here diverge on either side. Whereas to the south of Dumfries there is only the main route to Carlisle, in the northward direction we are at once confronted with these three different routes, whilst a fourth—the Cairn Valley line—leaves the main line at an outlying signal box some two miles north of the station. Opposite

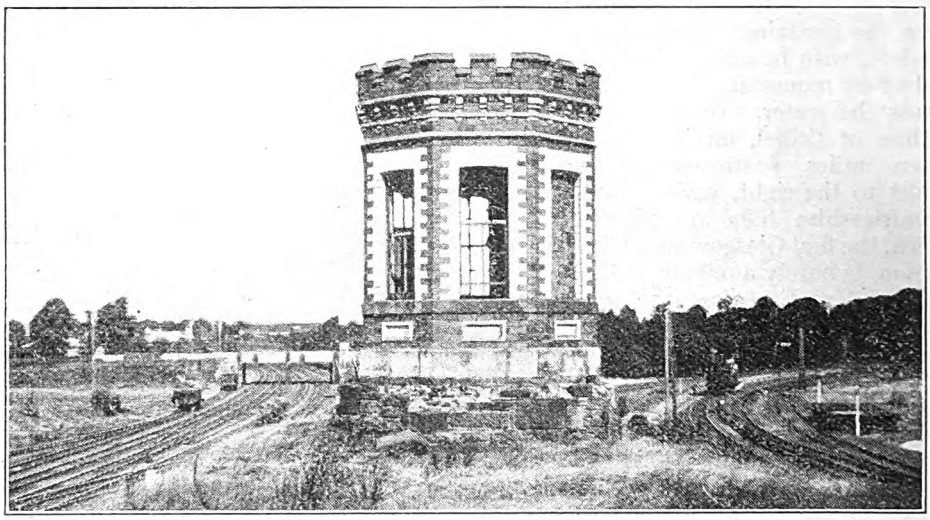

Photo.] [*J. J. Cunningham.*

ORIGINAL SIGNAL CABIN AT DUMFRIES.

G.S.W. Glasgow and Stranraer lines to left; Caledonian line to Lockerbie, right.

the station, but the current is now drawn from the town supply. The station hotel stands just opposite the station and is managed by the railway company. It is well arranged and well managed and is the recognised centre of much of the county life. As it is the only first-rate hotel in the town, its capacity is often taxed to the uttermost.

The engine sheds will accommodate about 30 locomotives and a considerable number of 4-4-0's are stationed here, together with many goods engines. Main line expresses, however, do not change engines at Dumfries, though they usually

Lockerbie Junction box is an interesting survival of the past, in the shape of a castellated telegraph-hut, placed high on the bank of the cutting, which was used in connection with the signalling of trains in early days.

The section of the line between Dumfries and Kilmarnock, a distance of 58¼ miles, is a straightforward piece of line calling for no special description. For the greater part of the distance the line follows the course of the river Nith, which is crossed several times. Between Carronbridge and Sanquhar stations, railway, road and river alike traverse a picturesque wooded defile

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with big hills rising sheer from its sides. Beyond Sanquhar the scenery is more bare and we traverse a small coal field. The summit of the line is reached at New Cumnock, 37 miles from Dumfries, and is 616 ft. above sea level. From this point the line descends sharply to Kilmarnock. From Dumfries to the summit it is hard collar-work almost all the way, and though the gradients do not exceed 1 in 150, it is a trying stretch for heavy trains.

The first section of the line that finally terminates at Stranraer is formed by the Kirkcudbright branch of the Glasgow and South Western. This is a double line as far as Castle Douglas (19¾ miles), where the old Portpatrick and Wigtownshire Joint Line diverges. The Stranraer route was described last month, so that no more in regard thereto need be said here.

The Cairn Valley Light Railway was opened in 1905. It extends as far as Moniaive, a large village, 17½ miles from Dumfries. It is, of course, single, and is of economical construction throughout. It was at first worked by a rail motor-car, but a short train of ordinary six-wheel rolling-stock is now employed. For a long time the train service consisted of only two trips in each direction daily, but for the past three years there have been three down trains and four in the opposite direction. There are frequent intermediate stations, and the district served is a very pretty one. Instead of the ordinary semaphores, Sykes "Banner" signals are employed on this branch, as at St. Enoch station, Glasgow.

The remaining line to be considered is that of the Caledonian section which connects Dumfries with Lockerbie, 14¾ miles distant, on the west coast main line. After leaving the Glasgow and South Western line a few chains to the north of Dumfries passenger station, the line remains double for about half a mile as far as the signal-box which controls the junction with the lines leading to the Caledonian goods station. This is of ample size, and includes a lofty bonded warehouse. Beyond this point the line is single, with crossing-places at Shieldhill and Lochmaben. About 2 miles from Dumfries is a platform serving the large motor works of Messrs. Arrol-Johnston, and special trains are run to convey workers to and from their work. At Locharbriggs there are extensive quarries of red sandstone, from which most of the building stone used in the district is taken.

Dumfries is an open station, tickets being collected in the corridors of express trains, and at adjoining stations in

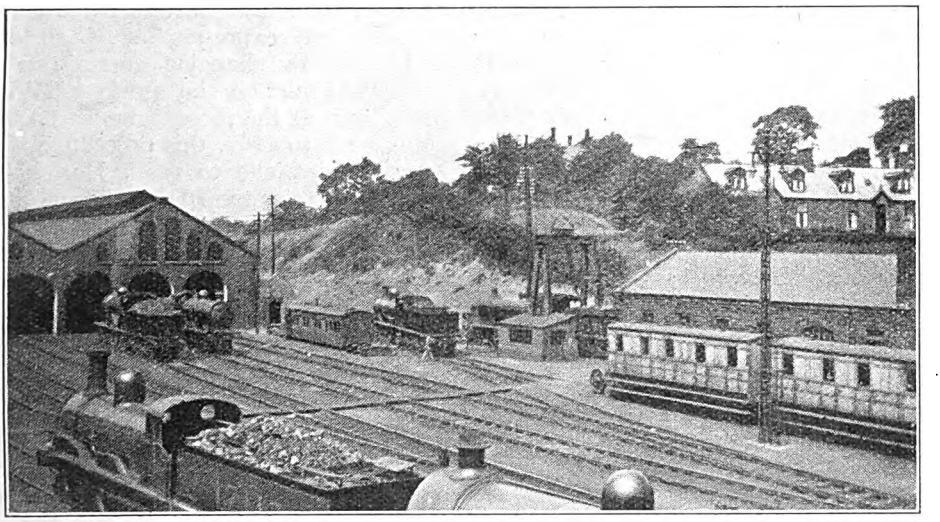

Photo.] [*J. E. Kite.*

ENGINE SHEDS AT DUMFRIES.

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the case of local and stopping services. Turning now to the train services, the main Anglo-Scottish route between London (St. Pancras) and Glasgow (St. Enoch) first claims our attention. Dumfries is 341½ miles from the former, and 82½ from the latter station. It has always enjoyed the full benefit of the excellent services formerly provided by the Midland and Glasgow and South Western companies, and now continued, on the same general lines, by the London Midland and Scottish. The only trains to pass Dumfries without stopping were the short-lived "flier" of 1908, which stopped only at Shipley (to change engines) and Carlisle between the two termini, and the second up night train (11.10 p.m. from St. Enoch), which formerly ran daily and used to make a non-stop run of 91 miles from Kilmarnock to Carlisle. Some of the stops before the war were conditional only, but they were usually made.

The quickest times between St. Pancras and Dumfries are at present 7 hr. 13 min. Down, and 7 hr. 22 min. Up. This represents a speed, including stoppages, of about 47 miles an hour, which is quite a good figure, especially in view of the many difficulties of the Midland route south of Carlisle. In pre-war days the Winter service required 7 hr. 6 min. (Down), and 7 hr. 15 min. (Up), but there was one Summer train (the 11.50 a.m. from St. Pancras) which reached Dumfries in 6 hr. 51 min.

If the quality of the service has not much deteriorated as compared with 1914, the number of trains shows a distinct falling off, for the afternoon service which used to leave London and Glasgow at 1.30 p.m. has never been restored since the War, and the second night service reappeared in 1920 only to be again withdrawn in May, 1924. The latter deficiency has to some extent been compensated for by the alteration of the 11.45 p.m. from Euston, a portion of which now runs from Carlisle to Glasgow via Dumfries and Kilmarnock, and fills what would otherwise be a serious gap in the express services between Dumfries and Glasgow. As, however, the St. Pancras train was 30 min. quicker than the present train from Euston, its disappearance is to be regretted. It should, perhaps, be noted that it was re-introduced, on Saturday nights only, in October, 1924, replacing the standard service which is now "Saturdays excepted."

Whilst primarily associated with the Midland route, Dumfries has also a long-cherished connection with Euston, and it has always been possible to reach the town quicker from the latter station than from St. Pancras. Thus, last Summer, when the Daylight Service to Ireland via Stranraer was running, one could leave Euston at 10 a.m. and arrive in Dumfries at 4.53, this representing a speed of all but 50 miles an hour. There was, moreover, a through carriage by this service, though the writer has never seen this advertised.

Apart from the Stranraer trains, the grouping of expresses at Carlisle is such that by changing there, one can save 10–15 min. on the quickest Midland times even at the present moment. And, going back to 1907, this procedure would have enabled one to reach Dumfries in 6 hr. 44 min. by the 10 a.m. from Euston, which is the quickest time the writer has been able to trace as having ever existed. The distance to Euston is, of course, nearly 10 miles shorter.

A list of the chief trains at Dumfries may now be given. At 3.22 a.m. arrives the first portion of the Stranraer boat train, which generally leaves Euston about 7.30 p.m., but has sometimes in Summer, both before and since the War, been operated from St. Pancras instead. During the Summer of 1924 this was the case in the down direction only. A second portion arrives at 3.59 a.m., bringing the through carriage of the L. & N.E. Railway from Newcastle, and also a portion from Carlisle to Ayr via Kilmarnock. This train is, therefore, divided at Dumfries and proceeds at 4.5 a.m. to Stranraer and 4.8 a.m. to the North.

On Sunday nights, however, the Stranraer sleeping saloon and through carriages are attached to the 8.30 p.m. ex Euston Postal Limited, a somewhat unique privilege, and on Monday mornings they travel by the second portion of this train north of Carlisle. The ordinary night service (9.30 p.m. from St. Pancras) is at Dumfries from 5.28 to 5.32 a.m. This train, and the corresponding up service, often include three Sleeping Cars in their

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composition. There is a through carriage from Bristol attached. At 7.22 a.m. came in, in 1926, the 11.45 p.m. from Euston, which consisted of West Coast rolling-stock and was hauled by two Caledonian locomotives. On several occasions the writer saw it arrive with no less than 15 vehicles, five of which were Sleeping Cars and one a Pullman Breakfast Car running between Carlisle and Glasgow. This train was allowed only 2 min. at Dumfries, but as it was apt to be too long for the platform, this time was often exceeded. More recently, however, the main train has resumed its old course via Beattock, and carriages, with through carriage from Euston. Proceeding to Stranraer at 5.2 p.m., it gives an arrival in Belfast at 10.35 p.m. Close behind it is the 9.50 from St. Pancras, bringing also a through carriage from Nottingham and Sheffield, which is at Dumfries from 5.3 to 5.6 p.m. The second Day service now leaves St. Pancras at 11.45 a.m. and reaches Dumfries at 7.15 p.m., leaving again at 7.18 p.m. for Glasgow. This train also conveys a through carriage from Bristol. Corresponding Up trains leave at 11.8 a.m. for St. Pancras, Nottingham and Bristol 1.53 p.m. for St. Pancras and Manchester

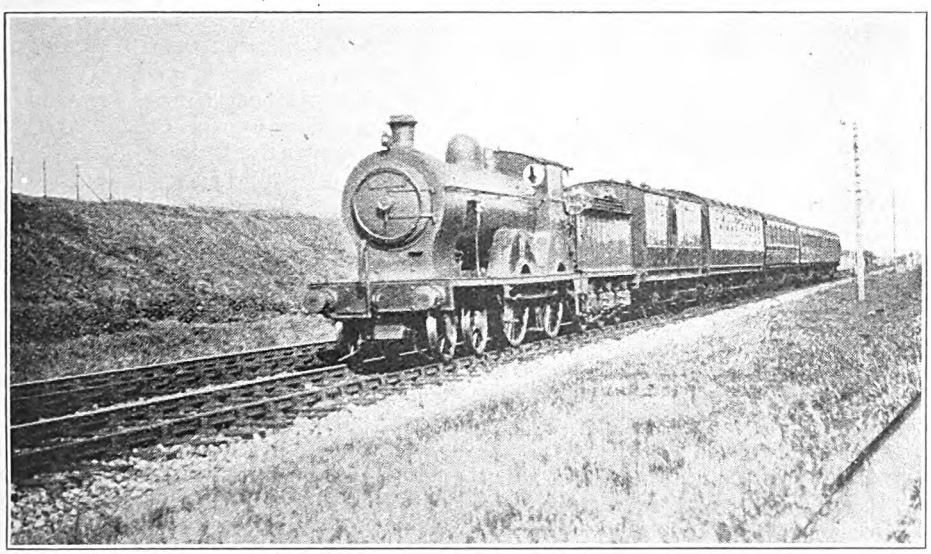

Photo.] [*C. J. L. Romanes.*

CARLISLE–GLASGOW TRAIN NEAR DUMFRIES.

G.S.W. 4-4-0 Locomotive No. 14201.

a separate portion, with sleeping-car from Euston to Kilmarnock, serves the Glasgow and South Western section, calling at Dumfries, 7.27 to 7.29 a.m. The next important Down train calls at Dumfries from 1.43 to 1.46 p.m. It conveys through carriages from Sheffield and Manchester (Victoria) via Hellifield to Glasgow, and has connections with the whole of the Midland system, leaving St. Pancras at 4.25 a.m. The addition of a portion at Carlisle, which now includes a Glasgow and South Western Restaurant Car, makes this a heavy train. In Summer only, the Daylight Service to Ireland arrives at 4.53 p.m. in the shape of a train of G. & S.W. corridor (Victoria), 2.40 p.m. (Summer only) Daylight Service from Ireland, reaching Euston at 10.0 p.m., 7.26 p.m. for Leeds and Bristol with the return working of the G. & S.W. Restaurant Car to Carlisle, 11.8 p.m. Sleeping Car train to St. Pancras (this leaves at 1.9 a.m. on Sunday only), and 11.58 p.m. from Stranraer to Euston (Sleeping Car).

All these trains run non-stop between Dumfries and Kilmarnock on the one hand (with the exception of the 4.8 a.m. and 7.29 a.m. from Dumfries), and southwards they are either non-stop to and from Carlisle or include a stop (sometimes conditional) at Annan.

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MR. J. RICHMOND, STATION MASTER.

In addition to the expresses, there are five or six stopping trains on the main line in each direction. These usually work through between Glasgow and Carlisle, though they may shunt at Dumfries to allow expresses to pass. The main line goods traffic is also extremely heavy, and the block sections are never unoccupied for long except on Sundays, when there is almost a complete cessation of traffic as is usual in Scotland. On the Stranraer line several of the trains, in addition to the boat expresses, work to and from Dumfries, and are often fast between Dalbeattie or Castle Douglas and Dumfries. Including Kirkcudbright trains the total number leaving Dumfries for the west is eleven, six of which call at all stations. To Lockerbie there are only five trains, with seven in the opposite direction, and an increased service on Saturdays, but though calling at all stations on the branch, they are of considerable importance, as they provide the chief means of communication between Edinburgh and South-West Scotland. Through carriages are run between Whithorn (in Wigtownshire) and Edinburgh in both directions, and these are sometimes attached to Liverpool-Glasgow expresses between Lockerbie and Carstairs.

The main trains between London (St. Pancras) and Glasgow (St. Enoch) have long been well known for the magnificence of their rolling stock. Both the Day expresses in each direction include separate Restaurant Cars for First and Third-class (some of them built in 1921), and to these is now added one of the new L.M.S. Central-Corridor Cars in which meals can be served if necessary. As the St. Pancras portion usually consists of six or seven vehicles, and there are the through carriages to Bristol, &c., and often extra vehicles working between Carlisle and Glasgow as well, the loads are seldom less than 240 tons and frequently rise to 300 tons at busy times. The 4-6-0 locomotives of the Glasgow and South Western Section and Midland type three-cylinder 4-4-0's are usually employed for these trains. Now, however, the other trains at Dumfries are mostly worked by 4-4-0's of various types, and consist of good bogie carriages for the most part. The Lockerbie trains are now hauled by Caledonian 0-4-4 tank engines, but this branch was formerly one of the last refuges of a very ancient class of 2-2-2 singles with outside inclined cylinders, and driving wheels of large diameter.

Mr. James Richmond (station master) entered the service of the Glasgow and South Western Railway at Girvan, 35 years ago. He has been station master successively at Trabboch, Pinwherry, Gatehead, Dreghorn, Newmilns and Mauchline, receiving his appointment to Dumfries in 1920. Under his capable command are employed 108 of all grades in the passenger station, whilst the goods department is separately organised under Mr. Barbour.

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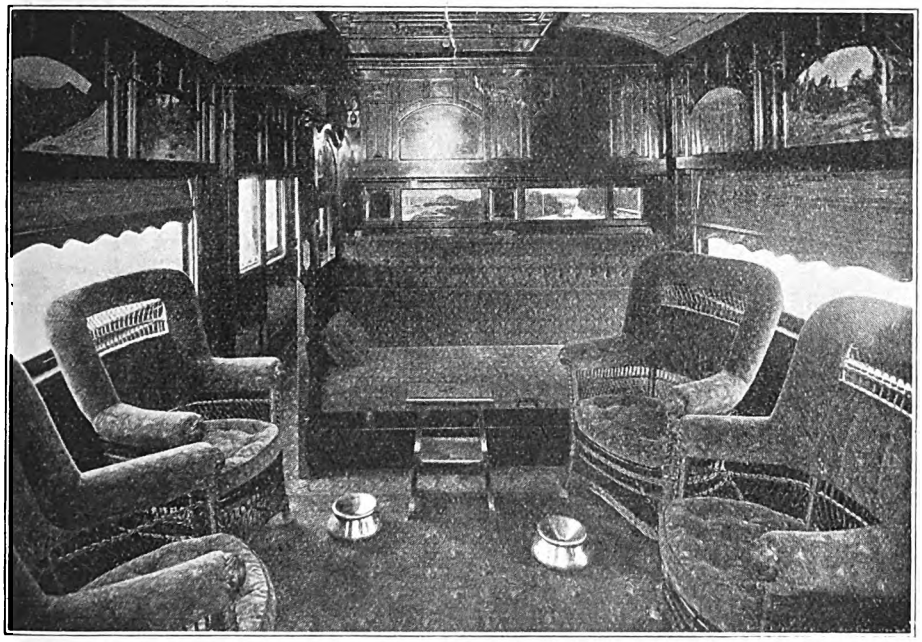

FIRST-CLASS SMOKING COMPARTMENT IN INTERSTATE SLEEPING CAR.

The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

V.—SOUTH AUSTRALIAN GOVERNMENT RAILWAYS.

(*Continued from page* 58, *January Number.*)

IN the first section of this article published last month, it was explained that although the State of South Australia cannot boast of being the largest in Australasia, nor, as is the case with New South Wales, claim to possess the most important transportation system, it can at least take credit to itself on the ground of progress and development in regard to high-capacity freight transportation. Many big developments are, indeed, to progress, not only on the engineering and operating side, as previously indicated, but also in respect of the provision of larger and more powerful locomotives and rolling-stock, as required to meet growing traffic demands and the introduction of new and improved operating methods.

Locomotives and Rolling-stock.

On June 30, 1924, the locomotive stock of the South Australian Railways comprised 486 units, 256 for the 5 ft. 3 in. gauge lines, and 230 for the 3 ft. 6 in. gauge lines. The former had a total tractive power of 4,173,077 lb., an average per locomotive of 16,301 lb., while the latter had a total tractive power of 3,634,167 lb., or an average per locomotive of 15,801 lb. The average tractive power of the broad-gauge locomotives will be increased substantially in the future, as the new Commissioner of the South Australian Railways has developed a big scheme for reducing train mileage and railway operating expenses by the introduction of high-capacity locomotives of the most modern design. Three new

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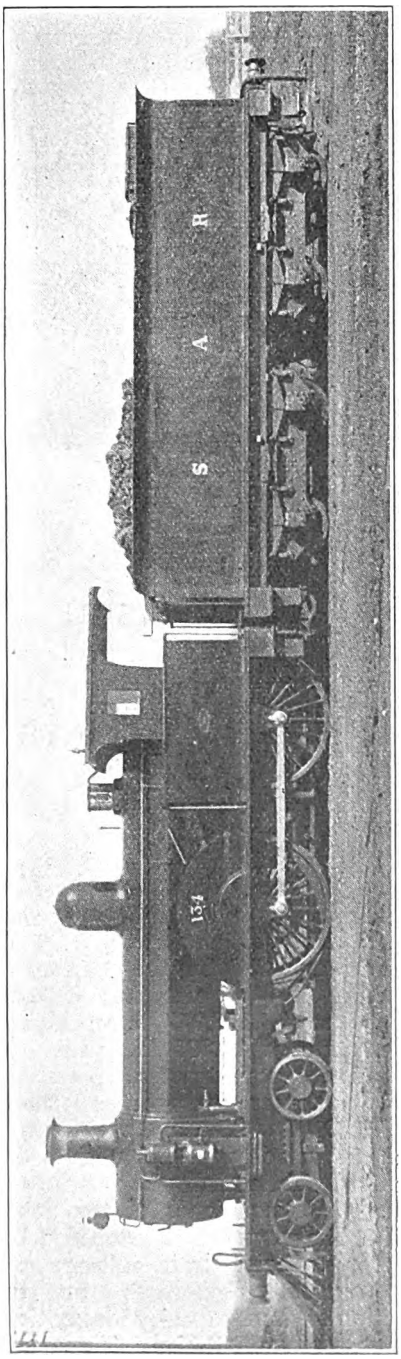
types are being built, one a " Mountain " (4-8-2) type of 51,000 lb. tractive effort, which will run the Melbourne expresses on the Adelaide-Murray Bridge Section, and also deal with heavy freight traffic. The two other types are a " Pacific " (4-6-2), of 37,000 lb., effort, designed for fast schedules on the Southern and Northern expresses, and a " Mikado " (2-8-2), of 40,000 lb. tractive effort for freight service on 60-lb. rails. Ten engines of each of these types have been built by Sir W. G. Armstrong, Whitworth & Co. Ltd.



4-4-0 TYPE (CLASS " S ") LOCOMOTIVE FOR 5-FT. 3-IN. GAUGE LINES.

Improved Locomotive Facilities.

It would obviously be of no avail to provide such large power units if suitable facilities were not available for their attention, and extensive works are now proceeding in the development of the necessary facilities. New locomotive depots are being erected at Mile End, Tailem Bend and Peterborough, these comprising roundhouses, repair shops, ashpits, engine inspection pits, water columns, coal-handling plant and mess rooms. The roundhouses are of timber construction with an asbestos metalled roof, and are lighted with " Imperial " flood light reflectors. The Mile End roundhouse has 42 bays, each 100 ft. long and containing an engine pit, while drop pits are provided under the three roads leading to the repair shop. An 85-ft. turntable of the continuous type, worked by an electric tractor, is located at the centre of the roundhouse. The ashpit is constructed of reinforced concrete with sloping sides and extends under two tracks, water jets being provided along both sides for the purpose of washing the ashes down, when they are removed by a grab.

Coal-Handling Plant.

In order to expedite the coaling of locomotives, nine reinforced coal-handling plants, constructed with capacities varying from 150 to 300 tons, are being installed at various centres throughout the State. The erection of 300-ton plants at Mile End, Tailem Bend and Peterborough, together with 150-ton plants at Port Adelaide and Port Pirie, has just been completed. These plants were provided by Roberts & Schaefer, of Chicago, and comprise an overhead bunker placed over three tracks, the incoming coal hopper trucks utilising the centre track, and engines to be coaled the two outside tracks. The incoming coal is dropped into underground bins, from which it is elevated into the overhead

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bunkers by bucket elevators of 1½ tons capacity, which automatically weigh the coal and tip it into the overhead bunkers. The depth of the pit from which the bucket is filled is 23 ft. below the natural surface. The 15-h.p. hoisting machinery can elevate 65 tons of coal per hour. The actual time for coaling a locomotive with a tender of 12 tons capacity is approximately two minutes. In addition there is a sand drying plant, and suitable arrangements for passing it on to the locomotive.

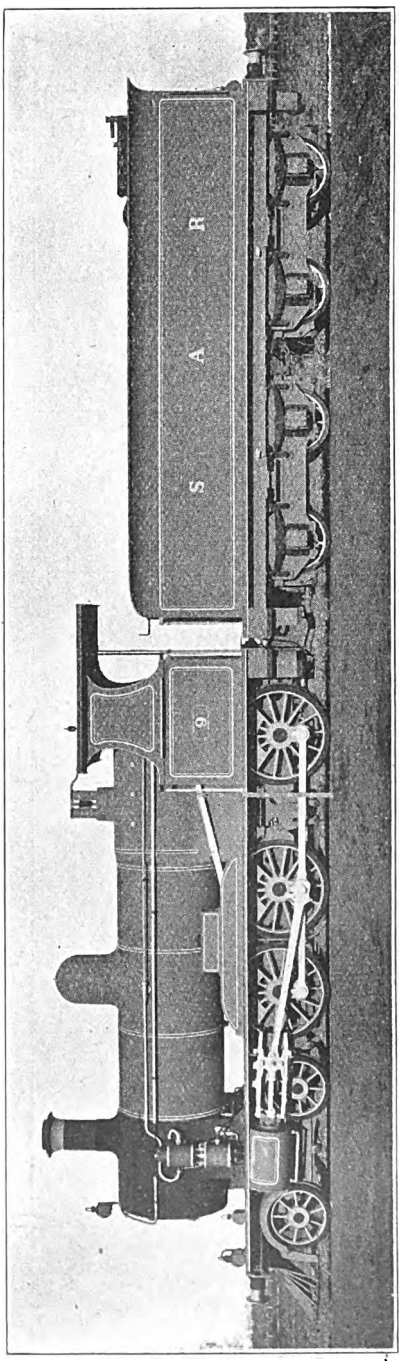
Coaching Stock.

The coaching stock on June 30, 1924, comprised 43 vehicles used in the interstate service and 475 other vehicles for the 5 ft. 3 in. gauge lines. 220 vehicles were provided for the 3 ft. 6 in. gauge lines. First-class passenger cars in the interstate service accommodate 48 seated passengers, and the second-class, 72, while the sleeping cars, of which there are 14 (first class only), each accommodate 20 passengers. Of the other coaching stock, for the broad gauge lines, there are 76 first-class cars with a total passenger capacity of 4,594, or 60·4 per vehicle, 214 second-class cars with a total capacity of 1,551 ft., representing an average of 72·5 per vehicle, and 90 composite cars with a capacity of 4,480 passengers, or 49·8 per vehicle. Reference will subsequently be made to the running of rail motor-cars on the South Australian Railways and it may here be added that there are nine of these vehicles with a total passenger capacity of 403, giving an average per car of 44·8. The average passenger capacity per vehicle on the 3 ft. 6 in. gauge lines is 29·2 first class, 63·1 second class, and 36 composite. On the narrow gauge there are also 4 sleeping cars, each accommodating 18 passengers, while on the broad gauge, other than in the interstate service, there is only one sleeping car with accommodation for 20 passengers.

Freight Stock.

The total freight stock on June 30, 1924, amounted to 9,321 units, with a total capacity of 89,413 tons, on an average of 9·6 tons per vehicle. Of the 4,010 broad gauge wagons, 2,991 were open goods wagons with an average capacity of 12·5 tons, 301 were sheep wagons, 205 cattle wagons and 110 brake vans. Of the 5,311 units used on the narrow gauge lines, 4,510 with an average total capacity of 9·1 per vehicle, were open goods wagons, 212 sheep wagons, 1·7 cattle wagons, and 124 brake vans.

As in the case of locomotives, so with



4-6-0 TYPE (CLASS "R") LOCOMOTIVE FOR 5-FT. 3-IN. GAUGE LINES.

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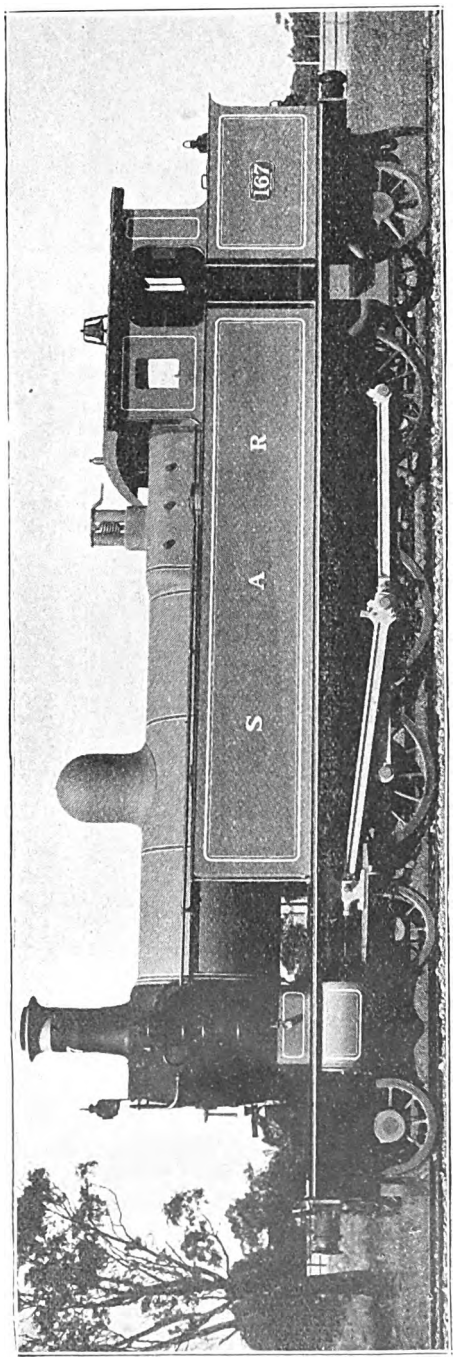
the wagon stock. Many high-capacity vehicles have been ordered, these comprising 600 40-ton all-steel gondola wagons, 500 30-ton all-steel box wagons, and 100 30-ton steel louvred wagons. The 40-ton all-steel gondola wagons have a tare weight of 18 tons and are fitted with M.C.B. couplings. The wagons have a clear floor space of 42 ft. 6 in. by 8 ft. 10 in. high. Access is obtained by four pairs of 5 ft. doors, hung vertically, giving two 10 ft. openings on each side when the centre stanchions are removed. The bogies are of the arch bar type—the wheels being 3 ft. diam. and 5 ft. 9 in. wheelbase—while the bogies are placed at 31 ft. centres. When these are actually in service the average tonnage capacity per vehicle will be raised considerably. In addition, 200 bogie flat wagons of 50 tons capacity are being built at Islington Works.



4-6-2 TYPE (CLASS "F") LOCOMOTIVE FOR 5-FT. 3-IN. GAUGE LINES.

The total service stock on the books comprises 516 units, the majority of these being water trucks, of which 120 are provided for the broad gauge and 235 for the narrow gauge.

Islington Workshops.

The principal workshops are located at Islington, not far from Adelaide, and considerable reconstruction is now taking place. The entire lay-out has been completely revised, and a modern locomotive repair shop, capable of handling the new locomotives, has been constructed. The whole of the reconstruction work has not yet been completed, but there are now definite signs that the work is nearing its end. Several of the old buildings, principally the smith and boiler shops, have been abolished, and larger structures erected in their stead. A new block, in course of erection at the time of my visit, comprises the smith and boiler shops and the erecting and machine shops. This building is of steel frame construction, has a saw tooth roof and galvanised-iron walls, and is suitably lighted. The length of the building is 600 ft. while it is 350 ft. wide. It is being equipped with the latest and most up-to-date plant, including many crane runways, one of 10 tons capacity for the machine shop, two of 70 tons capacity for the erecting shop, one of 45 tons and one of 15 tons capacity for No. 1 boiler shop, and one of 30 tons capacity for No. 2 boiler shop. The tool shop has also been entirely reorganised and equipped with the most modern machinery, and it is anticipated that this will have a very appreciable effect on the cost and quantity of the works output. The new scheme includes the use of electrical power for the operation of all machines. A considerable

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amount of wagon repair work is performed in Australia in the open, and for this purpose a new wagon repair yard has been laid down. This yard is entirely self-contained and is of an interesting design. It will enable all railway repairs to be carried out most expeditiously.

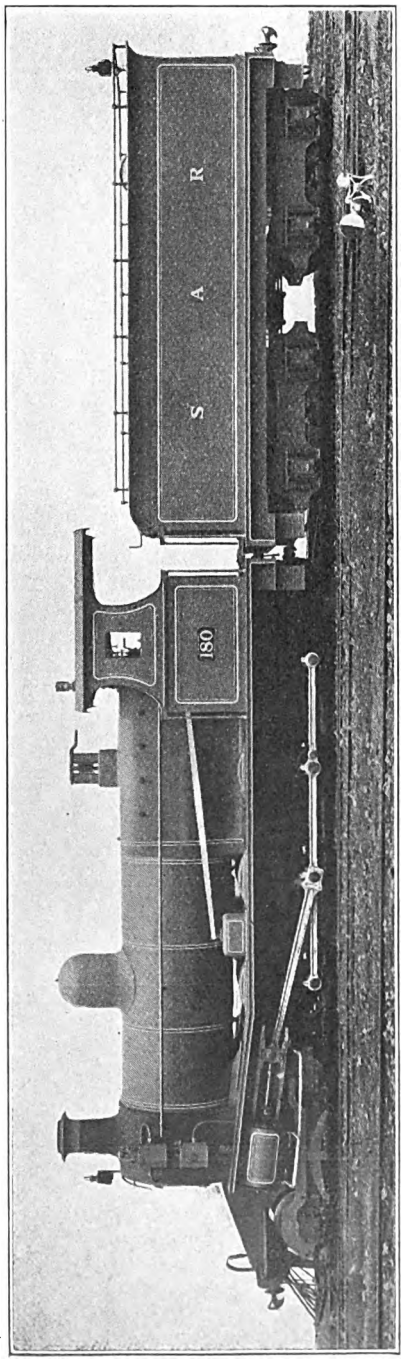
Passenger and Goods Traffic.

During the year under review there was a substantial improvement in both passenger and freight traffic on the railways of South Australia. The passenger journeys increased from 24,475,170 in 1922–23 to 25,177,933 in 1923–24. The average mileage per passenger was somewhat similar in the two years, that for 1923–24 being 33·41 miles country passengers and 6·75 miles suburban passengers. The total tonnage of freight hauled amounted to 3,565,307 in 1923–24, as compared with 3,283,594 the previous year, the principal increase being 242,312 tons of wheat, while there were slight decreases in the tonnage of wool and live-stock lifted. The average mileage per ton of freight was 107·87 in 1923–24, as against 112·23 the previous year, and the average earnings per ton-mile, 1·60d. and 1·55d. respectively. The fastest run in South Australia is that performed by the east-bound Melbourne express on the level stretch between Bordertown and Keith, where 28¼ miles are negotiated in 39 minutes, the speed thus being 43 m.p.h. Between Murray Bridge and Serviceton (Victorian border) the 136 miles are covered at 35 m.p.h., including five intermediate stops.

The principal passenger station is at Adelaide, where, during the busiest hours, between 5 and 6 p.m., 47 trains are handled. The average number of passengers dealt with during this period is 8,500. On January 1, 1925, 78,796 passengers were dealt with, this being the largest number passing through the station in one day. On October 8, 1924, 468 trains were platformed during the day; 17 trains can be platformed simultaneously at this station. The station at Adelaide, although laid out fairly well so far as passenger convenience is concerned, has no architectural merit. On one side it is below street level, and access is given to the circulating area by long gradual ramps. At the other side, where the station is at ground level, vehicular traffic is received. In the concourse there are train indicators of the clock face pattern, showing arrivals and departures.

New Station at Adelaide.

Some little time ago the Railways Commissioners obtained authority for the



4-8-0 TYPE (CLASS "T") LOCOMOTIVE FOR 3-FT. 6-IN. GAUGE LINES.

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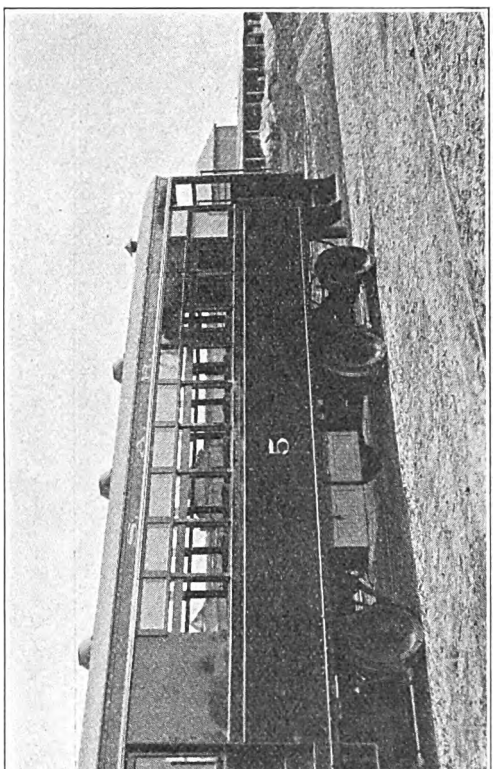
construction of a new passenger station at Adelaide, and accordingly invited competitive designs from architects practising in South Australia; 19 designs were received, these being later reduced to three. A decision has recently been made in favour of Messrs. Garlick & Jackman, and the construction of the new passenger station was recently commenced. The reconstruction will be a notable one, and will bring Adelaide right up to the standard set by Sydney and Melbourne in connection with their principal passenger terminal stations. In the new building the headquarters staff of the railways will be housed, and this will be an advantage, as at present they are located in a suite of Government offices some distance away from the station.



PETROL RAIL CAR FOR 5-FT. 3-IN. GAUGE LINES. ACCOMMODATION FOR 45 PASSENGERS. TARE, 13 TONS 2 CWT.

Improving Freight Traffic Facilities.

The principal goods yard is at Mile End, about 3 miles from Adelaide. Approximately 360,000 tons of traffic, loaded in 63,000 vehicles, are handled in this yard during the year, while 146,000 tons of traffic (principally general merchandise), loaded in 42,000 vehicles, is forwarded from Mile End to other stations. A certain quantity of livestock is also handled in this yard, but the principal livestock traffic for Adelaide is handled at Abbatoirs station, 8 miles from the city. A large number of vehicles pass through Mile End, other than those containing traffic for that place, the yearly figures being 125,000 wagons, conveying approximately 600,000 tons. In connection with the improvements in operating facilities at Mile End, four additional departure tracks are being provided for the south-bound freight trains, in order to leave the marshalling sidings free, together with a reception track, and seven additional tracks for handling inwards south bound freight trains. New 70-ton weighbridges are also being installed in place of the existing 30-ton weighbridges for the purpose of dealing with the high-capacity vehicles that will be using the yard. Other developments are proceeding in connection with the improvement of operating facilities. At Tailem Bend a marshalling yard is being provided for handling the traffic from the Murray lines. This will be capable of dealing with trains up to 2,500 ft. in length.

The total standing room is over 13,000 ft. and the yard can be e

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ended to twice this capacity. In addition, a sorting yard is being constructed at Dry Creek, a small station on the main north line 6½ miles from Adelaide. This yard is being provided to keep the large volume of traffic passing from the north for Abbatoirs and Port Adelaide, and *vice versa*, out of the metropolitan area. It will serve the above, and in addition to facilitating the working, will considerably relieve the Mile End yard.

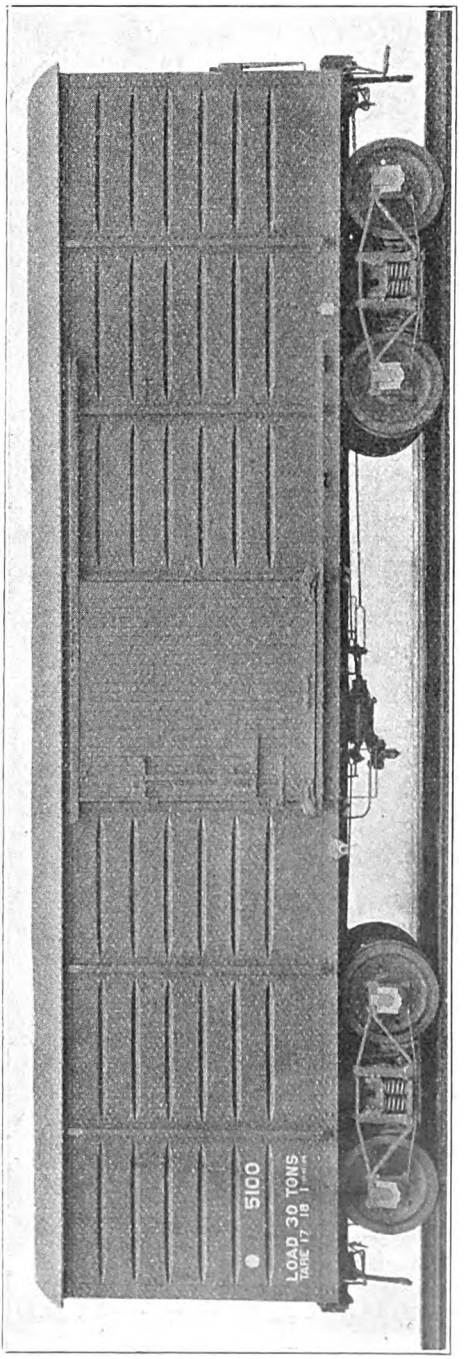
Signalling and Train Control.

The signalling generally comprises permissive block and electric staff on country lines; lock-and-block on double lines, and three-position permissive block on single main lines, with complete automatic signalling on double lines.

Between Adelaide and the River Murray, a distance of 60 miles, the South Australian Railways pass over a mountain range 1,630 ft. above sea level, and except for a small section at the Adelaide end, have only a single track. This line is part of the through route to Melbourne and carries heavy traffic, and some time ago, in an effort to improve the working, the line was equipped with electric automatic signals, while a control system was introduced to supervise the movement of trains.

The controller, who is located in the Divisional Superintendent's office at Adelaide, with the aid of telephones of the "Selecta" type, is able to communicate with all points between Adelaide and Murray Bridge. All stations being thus in direct communication with the controller, that official is enabled to exercise a close supervision over the working, and by means of graphs and train indicator boards to control the movements to the best advantage. At many small sidings where the automatic signals have been installed, signalmen have been dispensed with, the crossing of trains being arranged by precedence. In this connection, it is the general rule for the superior train to take the main line, the Adelaide controller usually confirming this to the train crew at the last-attended station. All stations advise the controller daily at 5 p.m. the number, class and destination of loaded and empty wagons, live-stock vans, &c. Truck supply officers advise the controller at 2 p.m. daily of the trains required for the following day, and only the locomotive depots and initial station are informed of extra trains, other than those in the numbered time-table schedule.

By the courtesy of the Railways Commissioner, we have recently been



30-TON BOGIE BOX WAGON. TARE, 17 TONS 18½ CWT.

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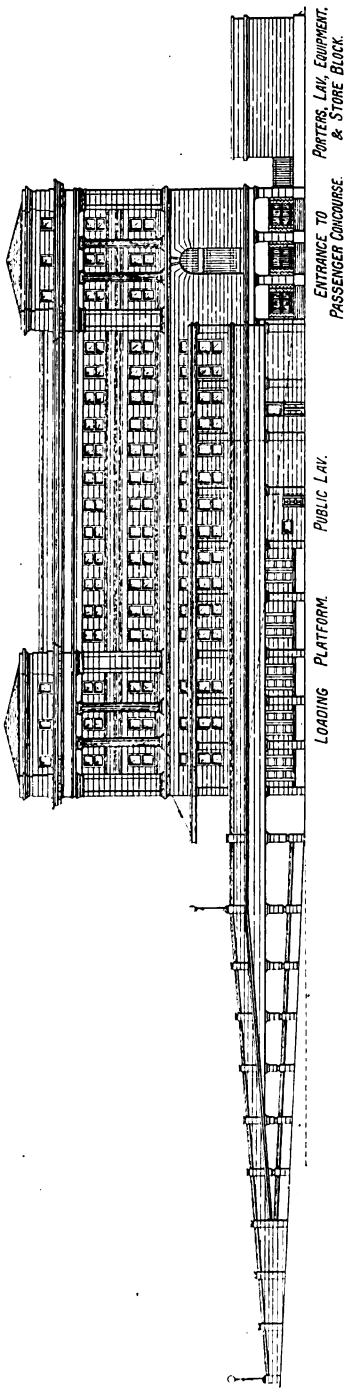
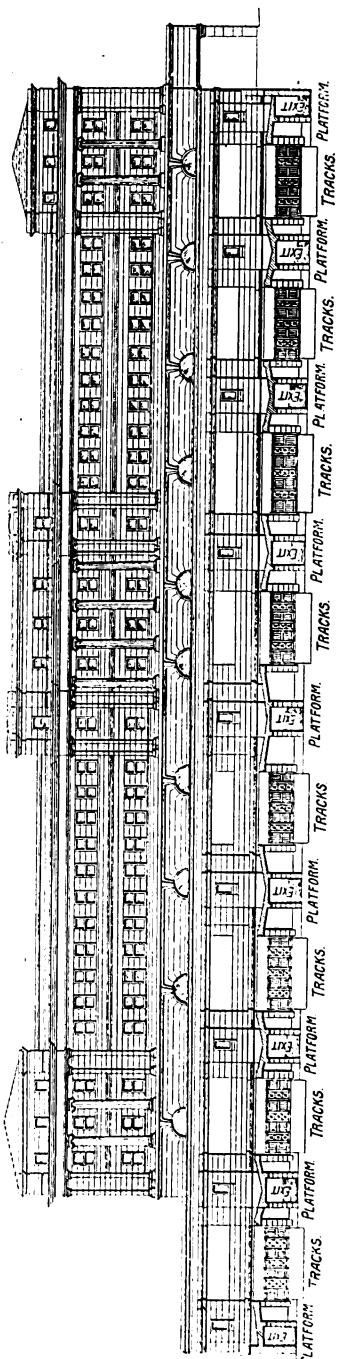


Northern Elevation.



Western Elevation.

NEW PASSENGER STATION AT ADELAIDE.

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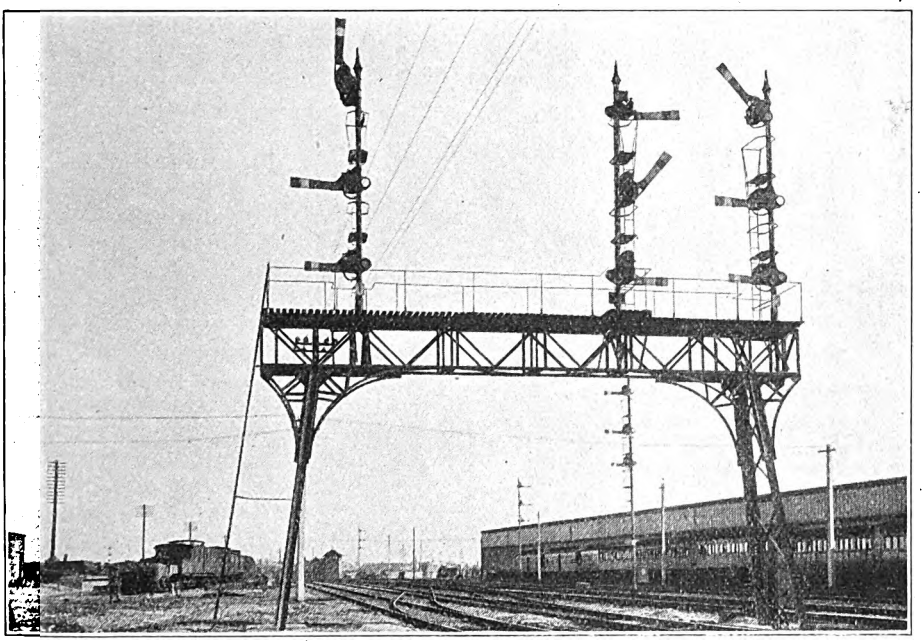
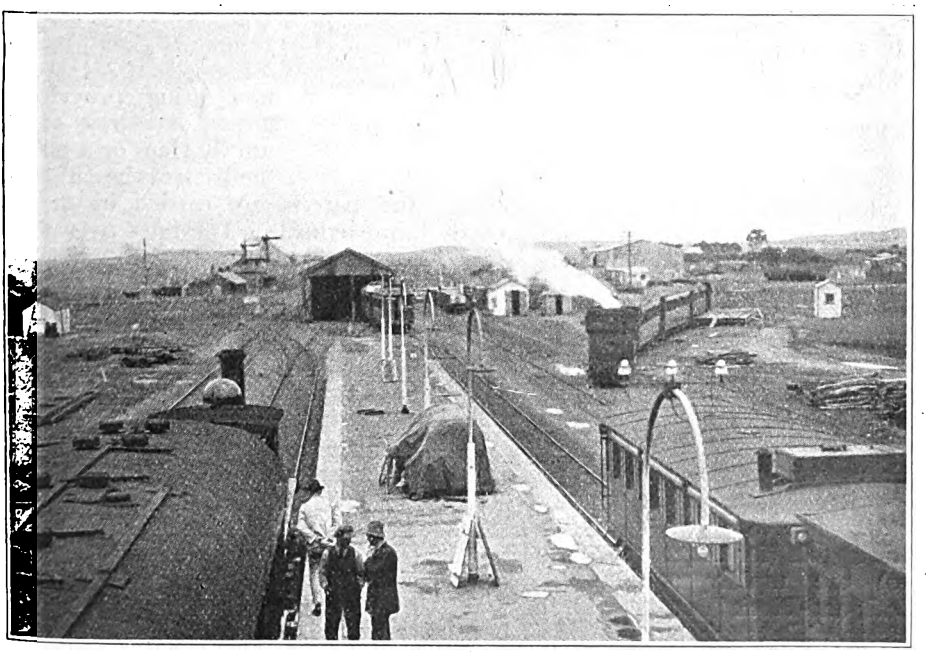


ELEVATED THREE-POSITION ELECTRIC SIGNALS, ADELAIDE.



TEROWIE, A BREAK-OF-GAUGE STATION.

5-ft. 3-in. gauge tracks on left; 3-ft. 6-in. gauge tracks on right.

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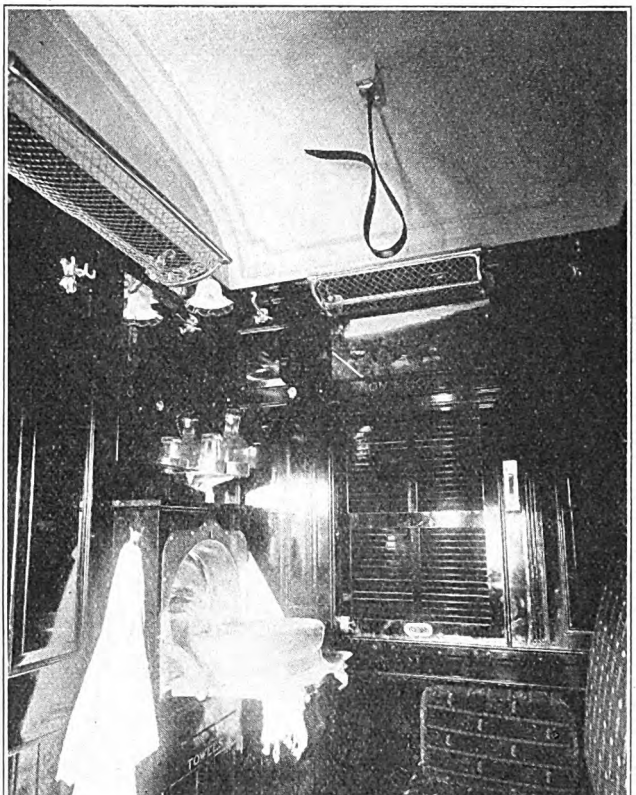

3-FT. 6-IN. GAUGE SLEEPING CAR, ARRANGED FOR DAY USE.

supplied, through the Divisional Superintendent at Adelaide, with a graph and table detailing a very creditable performance on May 6, 1925, when 134 trains crossed each other within 5 miles distance in 24 hours on a single track. The stations concerned were Backwood, Belair, and Long Gully, and it is reported that on that day 89 trains passed over the single line portion of track in 24 hours.

This system of control is being extended to various suburban lines and on the northern line to Terowie. Electric automatic signals (for the most part for single lines) are rapidly replacing the old "Lock-and-Block" or "Electric Staff" working, while telephones of the "Selecta" type are being installed for train control.

Rail Motor-car Services.

In order to give a daily passenger service on lines where the traffic did not warrant a steam passenger train—and which, consequently, were served by mixed trains—an experimental rail motor-car service was introduced on the South Australian Railways in February, 1924. The immediate success of the new class of service induced an extension of the facilities, and at the present time there are nine different sections on which rail motor-cars run, in some cases to augment the steam service on lines which did not justify two trains per day. On the lines with light traffic the daily mixed train is generally superseded by the daily rail car and perhaps a tri-weekly freight service. The cars are petrol driven, of steel structure, weigh 13 tons 10 cwt., and are fitted with the Westinghouse brake. They are divided into three compartments (one for the driver, one for passengers and a back platform), are of one class, and have seating accommodation for 46 passengers, lavatory accommodation being provided. The means of ingress and egress are by steps or a platform at the back of the car. Luggage and parcels are carried in the driver's compartment. The lines over which the cars work vary from 41 lb. unballasted to 80-lb. ballasted, and they can negotiate without difficulty grades of 1 in 45, with a ruling 10-chain curve. The speed between stops varies from 20 to 27 m.p.h., but after an extensive trial the speed on certain sections is being increased. The average operating expense is 11d. per train-mile.

The increase in traffic due to the introduction of rail motor-cars is shown by a comparison of tickets issued on the section between Adelaide to Spalding and Karoonda to Waikerie, for the six months ending December 31, 1924; in the former the increase was 58 per cent., and in the latter, 56·8 per cent.

Road Motor Services.

In common with other railway administrations, the South Australian Railway

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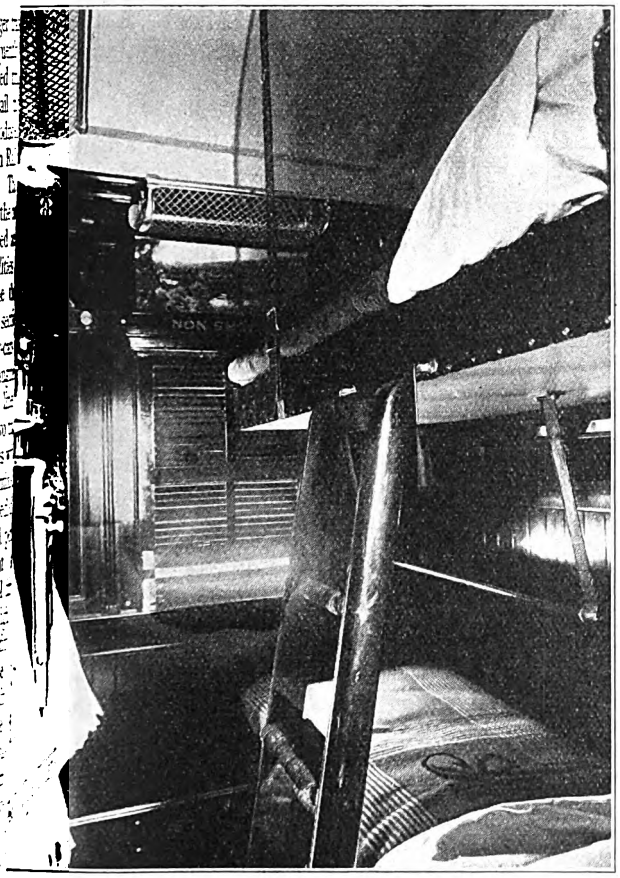
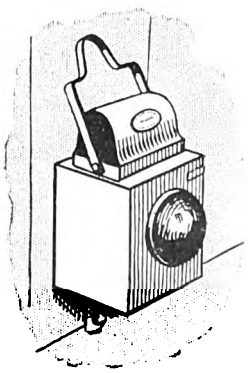


3-FT. 6-IN. GAUGE SLEEPING CAR, ARRANGED FOR NIGHT USE.

have had their earnings diminished owing to road competition, and with a view to combating this the Railways Commissioner recently instituted a Motor Department. During the last few months three passenger road motor coaches have been operating between Adelaide and Victor Harbour, a popular seaside resort, which, although 82 miles apart by rail, are only 52 miles distant from each other by road. The service has proved satisfactory, and orders have been placed for further vehicles. The cost of running the coaches, after allowing for working expenses, depreciation, interest on cost, maintenance, &c., is 1s. 3d. per mile.

In several country districts it is proposed to build coach bodies for combined passenger and baggage transport, while between Adelaide and Glenelg, a distance of only 7 miles, where road competition has been severely felt, it is intended to run double-decker motor-buses, each seating about 60 passengers.



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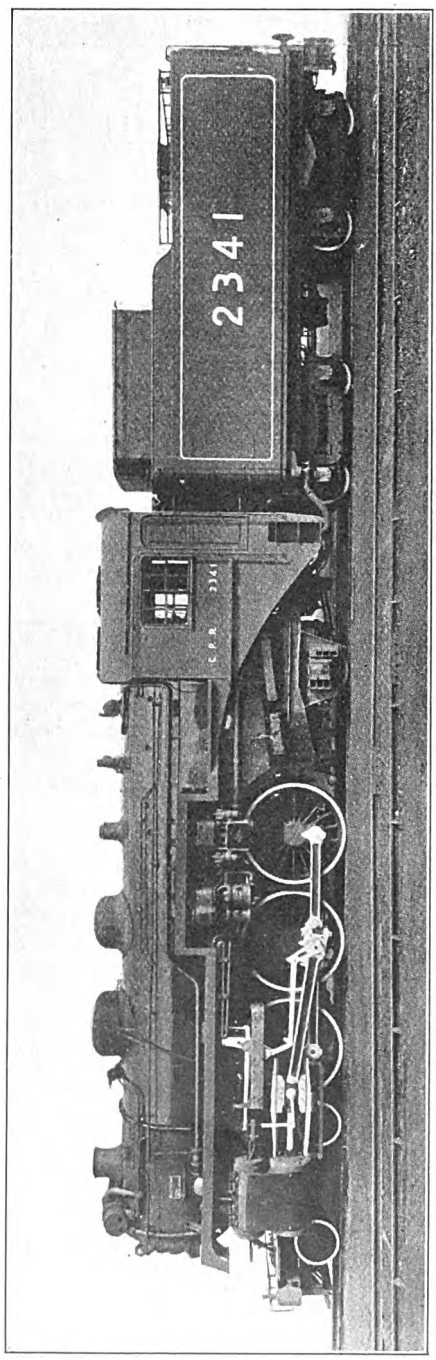
New 4-6-2 Locomotives, Canadian Pacific Railway.



BY courtesy of the Canadian Pacific Railway, we are enabled to reproduce herewith a photograph and some dimensional particulars of a new "G-3-d" class locomotive, of which 24 have been ordered from the Montreal Locomotive Works.

The new class is similar in general design to the well-known "2300" series in service on this line. A number of improvements have, however, been embodied. The most notable development is the increase of boiler pressure from 200 lb. per sq. in. to 250 lb. per sq. in., accomplished by using a stronger nickel-steel boiler plate, which does not materially increase the weight of the locomotive. Incidentally, it is claimed that this is the first instance of a nickel-steel boiler shell plate being used in locomotive boiler construction on the American continent.

The boiler, which has a maximum outside diameter of 7 ft. 4 in., has 28 2-in., 160 2¼-in., and 40 5½-in. diameter tubes, giving a total of 228 tubes, each 18 ft. in length. The heating surface totals 3,272 sq. ft., made up as follows: tubes, 1,950 sq. ft.; flues, 1,031 sq. ft.; firebox, 258 sq. ft.; arch tubes, 33 sq. ft. The superheater provides an additional 864 sq. ft. of heating surface. The latter has a combined header and regulator, thus permitting the use of superheated steam for the auxiliary equipment. Feed-water heaters are included in the design.

The following table gives the principal dimensions of the class:—

Cylinders (2), diam.	23 in.
,, piston stroke ..	30 in.
Wheels, coupled, diam. ..	6 ft. 3 in.
Wheelbase, engine	35 ft.
,, rigid	13 ft. 2 in.
,, engine and tender	67 ft. 10 in.
Boiler, total heating surface, with superheater	4,136 sq. ft.
Grate area	65 sq. ft.
Boiler pressure	250 lb. per sq. in.
Weight of engine in working order	136 tons 17 cwt.
Weight of tender in working order	85 tons 5 cwt.

The tender is mounted on two four-wheeled bogies, and has a capacity of 8,000 gallons of water and 12 tons of coal.

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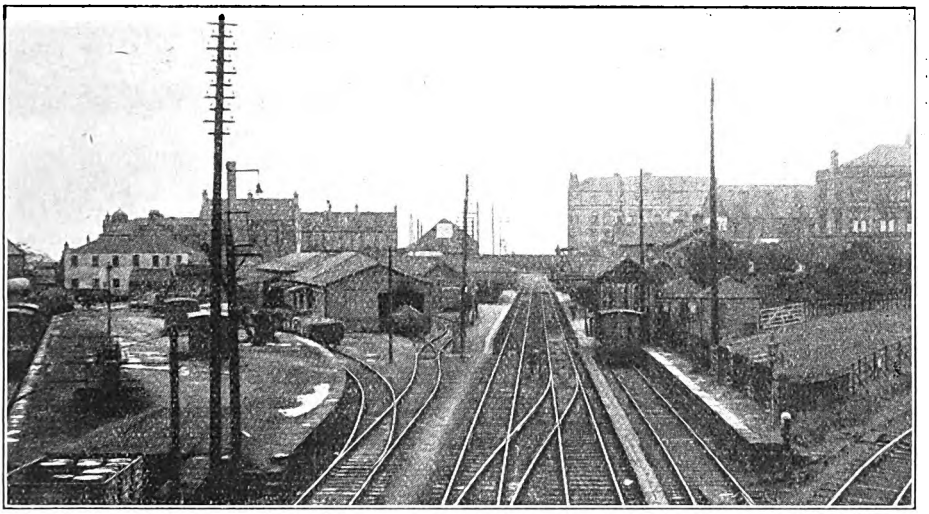

Photo.] FALKIRK (GRAHAMSTON) STATION. [*J. F. Gairns.*

Edinburgh and Glasgow Routes of the L.N.E.R.—[No. II.]

By J. FRANCIS.

IT is now necessary to transfer attention to the north of the Edinburgh and Glasgow main line for the purpose of considering the Falkirk (Grahamston) and Larbert, Grangemouth and Bo'ness lines, with the Kilsyth and Bonnybridge and Torrance routes.

It will be remembered that the original Edinburgh and Glasgow Railway included the branch from Polmont to Falkirk (Grahamston), and this involved association with the Scottish Central Railway, now part of the L.M.S. (Caledonian) system, but then providing connections which were of advantage to the Edinburgh and Glasgow Railway, as it completed an important and useful series of connections. This, in conjunction with other arrangements either with the Scottish Central or the Caledonian Railways, accounts for the intricacy of the interworking of the L.M.S. and L.N.E. companies in this area. Thus, L.M.S. trains from Princes Street (Edinburgh) use the L.N.E. line from near Haymarket to Polmont, and through the Grahamston and Camelon stations at Falkirk and round to Larbert; both companies work to Grangemouth, though the harbour and docks and part of the route thereto belong to the L.M.S. system, and L.N.E. trains for Stirling and Alloa from Glasgow transfer to the L.M.S.R. at Greenhill and through Larbert to Stirling and Alloa, also to Alloa via Alloa Bridge.

Polmont station has, on the up side, a bay line, from which local and Bo'ness trains run, and on the down side, at the Glasgow end, it is indented and continued as a platform for an adjoining line, from which local trains towards Glasgow or Falkirk leave. The junction for Falkirk is a short distance beyond, the branch (double track) then descending away from the main line, passing a colliery and traversing a rather pretty route until it joins the Grangemouth branch, the open country here giving views to the distant hills on the other side of the Firth of Forth.

Factory premises indicate the industrial activities of Falkirk, and then Grahamston station is reached. This is the principal of the three stations in Falkirk, though it is the main-line station, known as

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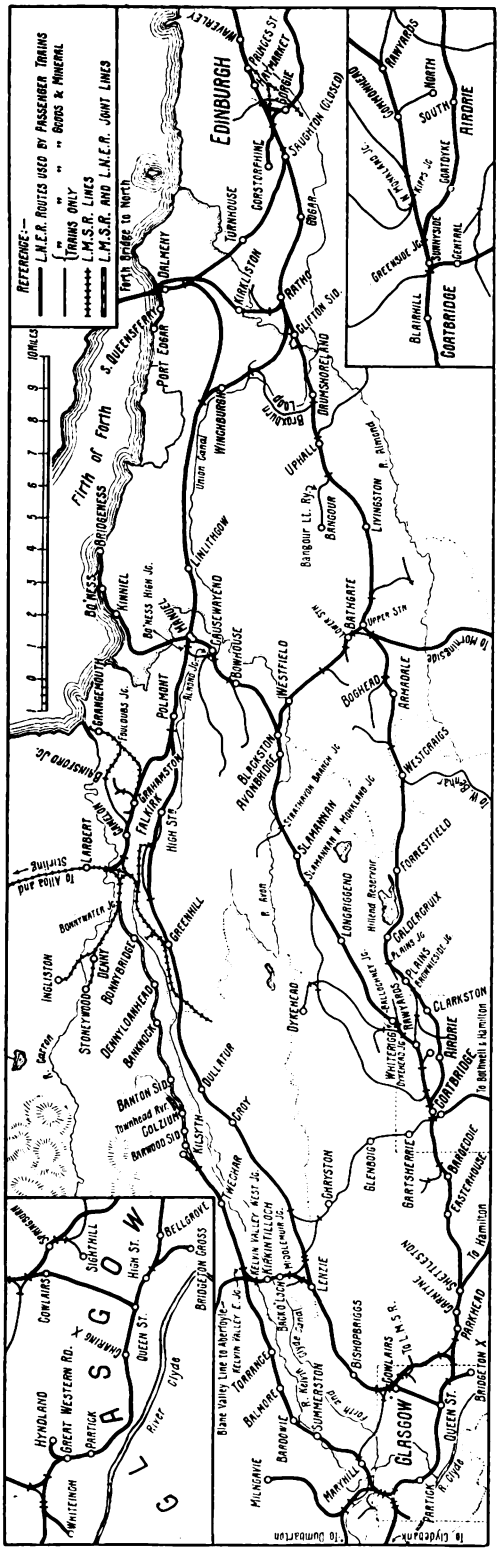

REFERENCE:-
L.N.E.R. Routes used by Passenger Trains
" " " Goods & Mineral
Trains only
L.M.S.R. Lines
L.M.S.R. and L.N.E.R. Joint Lines
EDINBURGH
Princes St.
Waverley
Haymarket
Slateford
Slateford Jc.
Slateford Jn.
Slateford Sid.
Slateford Sid.
Slateford Sid

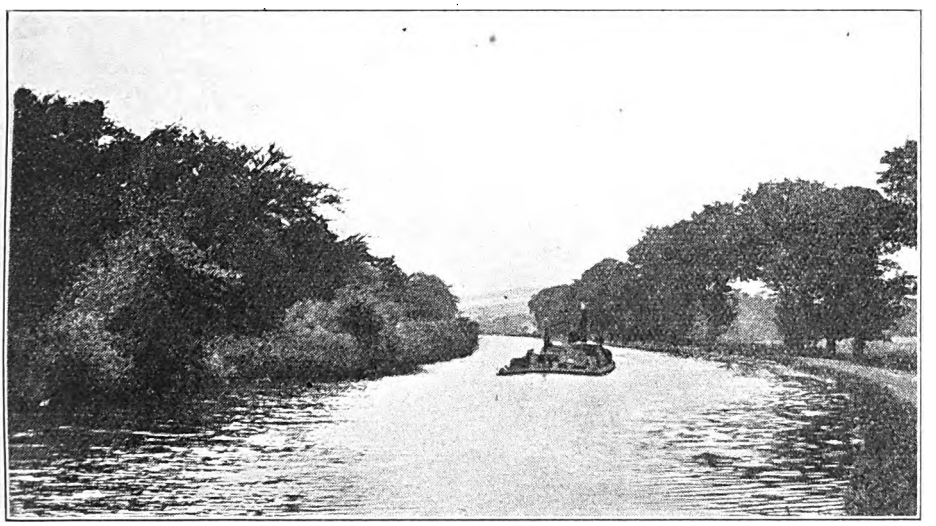
single track; it is quite picturesque, through undulating and wooded country, until this is displaced by views through the trees of the waters of the Firth of Forth and the hills beyond. The line, in fact, follows the water side very closely until Kinniel station is reached. Thence, although still close to the water, colliery waste heaps and sidings, &c., change the character of the view. The Bo'ness terminus has a single platform on a curve, with adjoining sidings, and the branch terminates with a group of lines finishing at right angles to the bank at a place called Bridgeness. The actual harbour is on a peninsula, and is served more particularly by rail connections between Kinniel and Bo'ness stations. The harbour, which belongs to the L.N.E.R., has a deep water area of 6 acres, with a quayage of 1,900 ft., while the dock has a water area of 7 acres and a quayage of 2,400 ft. Bo'ness is a considerable shipping port for coal and general traffic, but is particularly important for the importation of pitwood for Scottish collieries.

Brief reference must now be made to the Torrance and Kilsyth lines. There are several routes by which these can be reached from the Glasgow area, but the Torrance route may be considered from Maryhill and the other from Lenzie Junction.

Many trains work via Summerston, Bardowie and Balmore to Torrance. Like most other lines considered, the surroundings are industrial and largely colliery but as the River Kelvin is followed fairly closely the open country sections offer opportunities for picturesqueness. Many trains make Torrance their terminus, but the route continues onwards to join the line to be next considered at Kelvin Valley East Junction, where the Blane Valley line crosses.

The Kirkintilloch route leaves the main line at Lenzie Junction. Leaving the main line immediately beyond the station, double track serves colliery and industrial premises until, at Middlemuir or Monkland Junction, connection is made with the original Monkland and Kirkintilloch Railway. This is, however, immediately left, as the old line goes to the basin on the Firth and Clyde Canal. Our route, therefore, continues to Back o'Loch Halt (a two-platformed station in cutting, opened 18 months ago). The Loch itself is not, however, visible.

Beyond the station the River Kelvin is crossed and becomes a close companion until, approaching Kirkintilloch station, both river and railway pass *under* the Forth and Clyde Canal. The goods yard is alongside the station and beyond the river, which soon after passes under the



ON THE FORTH AND CLYDE CANAL, NEAR FALKIRK.

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line again. At Kelvin Valley West Junction the Blane Valley line turns north and west for Aberfoyle, while the Kilsyth line joins the line from Torrance and is thenceforward single-track. The country traversed becomes fairly interesting, while the River Kelvin and the Forth and Clyde Canal continue to add scenic attributes, as they remain close companions with the railway for several miles.

At Twechar there are colliery surroundings. At Kilsyth Junction the line into Kilsyth (Old) station keeps on the lower level, giving access to the terminal (one platform with run-round line and goods yard), while the Kilsyth and Bonnybridge Line, over which the L.M.S.R. also runs trains, rises to Kilsyth (New) station (one platform). The two stations thus together serve the fair-sized colliery and industrial town of Kilsyth.

Passing Barwood Siding, Colzium station (now closed) is reached, and beyond at Townhead Reservoir can be noted on the left. Getting high up on the hillside, some interesting views are had over the valley, until, after passing Banknock and Dennyloanhead stations, Bonnybridge (Central) station is reached. Approaching the station, a good view is had over the town of the same name, as Bonnybridge is also served by L.M.S. and L.N.E. main lines whose routes are not far away.

Then at Bonnywater Junction the Kilsyth and Bonnybridge line comes to an end by connecting with the L.M.S. Denny branch, and at the Denny Junction there are triangular connections with the L.M.S. main line. At the same point are corresponding triangular curves on the other side to and from Falkirk (one side L.N.E.R.), and so to Larbert. This station has two long main platforms, centre through lines, and bays on each side at the north end and on the up side at the south end. The station is L.M.S. property, but a fair number of L.N.E. trains exercise running powers, and most of these will come under notice in a few remarks concerning the train services on the sections which have been considered.

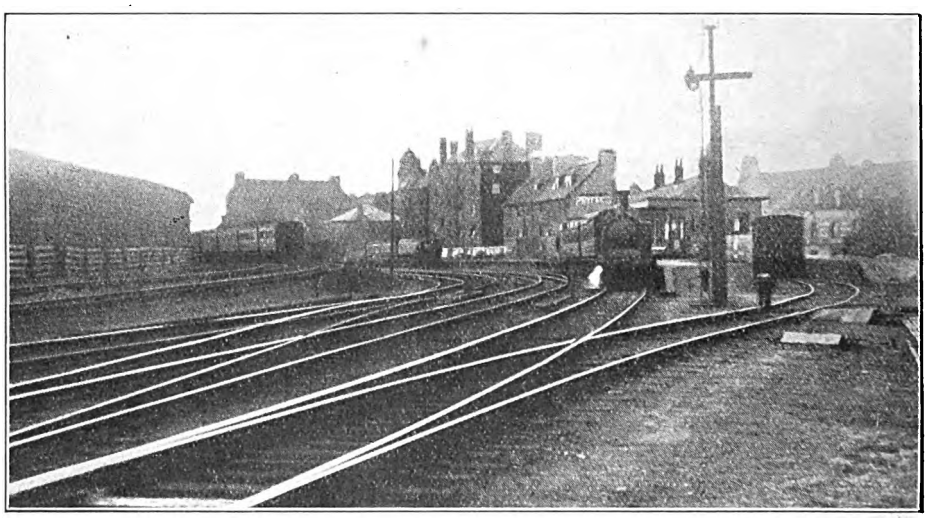

Photo.] LOCAL TRAIN AT BO'NESS STATION. [*J. F. Gairns.*

From Edinburgh to Larbert via Falkirk, most of the trains are, as might be expected L.M.S., in that the 7.0, 9.25 and 11.30 a.m. and the 1.10, 4.25 and 9.45 p.m. from Princes Street are the L.M.S. connections from Edinburgh at Larbert or Stirling with L.M.S. main line services. There are, however, L.N.E. trains from Waverley at 3.27 and 5.31 p.m., which work through at least as far as Larbert, while several others continue from Polmont to Falkirk (Grahamston), if not further. In the opposite direction, the 5.40 and 8.5 p.m. from Larbert are L.N.E.R. trains to Waverley. There are also two trains, 7.50 a.m. from

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Bo'ness and 8.48 from Larbert, which run between Bo'ness and Larbert via Polmont and avoid Manuel station. Besides these there are frequent local trains between Polmont and Falkirk (Grahamston), and between Larbert and Grangemouth, so that there are fairly frequent services all day long by the combination of these various trains and a few others. As Grangemouth Docks are L.M.S. property, a majority of the trains on this section are L.M.S., but there are several worked by the L.N.E.R. Among these may be specially mentioned the 8.20 a.m. and 4.14 p.m. through trains from Glasgow (Queen Street H.L.) to Falkirk and Grange-

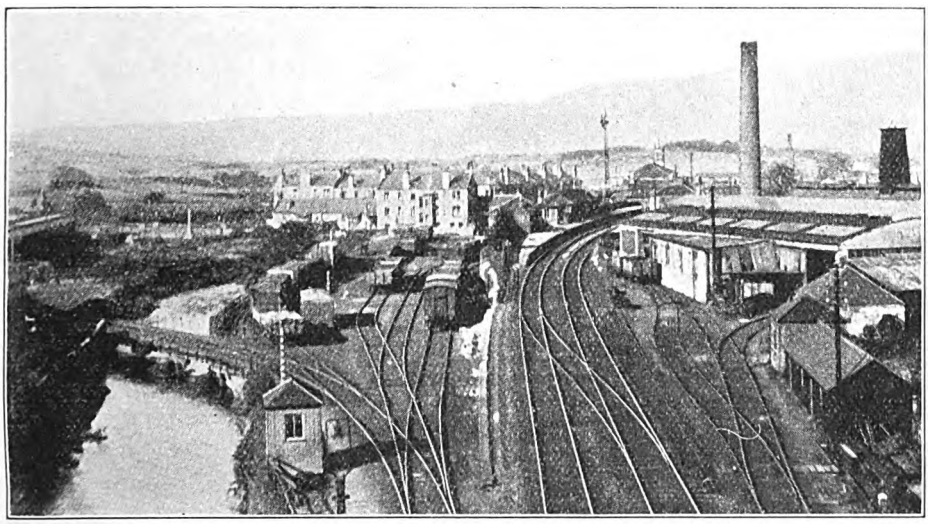

Photo.] [*J. F. Gairns.*

KIRKINTILLOCH STATION, FROM THE FORTH AND CLYDE CANAL.

mouth, and the return trains at 10.15 a.m. and 6.47 p.m.

The Bo'ness branch is served both by locals from Manuel (Low Level) and through trains from Coatbridge or Bathgate, and by connections from Polmont, avoiding Manuel station. Some of the latter work in conjunction with the Polmont-Falkirk (Grahamston) local services, while others run independently, as connecting services both ways have to be provided with main line trains at Polmont, a number of the expresses calling there. Combining the respective routes, the Bo'ness branch has some 15 or 16 trains each way daily.

In the case of the Kilsyth route to Larbert, the train services include several interesting features. The 5.37 a.m. from Bridgeton Cross travels via Maryhill to Torrance, returning therefrom at 6.45 to Queen Street (L.L.), thence working through to Hamilton. The 6.32 a.m. from Bridgeton Cross follows the same outward route to Torrance, but continues to Kilsyth (Old) station, whence it works back to Bridgeton Cross the same way. The 6.25 a.m. from Bonnybridge uses Kilsyth (New) station, but from Twechar works to Queen Street (H.L.) via Kirkintilloch. Leaving at 8.13 a.m., it follows the same route to Bonnybridge and comes back at 9.30 a.m.

Meanwhile, a train leaves Kilsyth (Old) for Queen Street (H.L.) via Kirkintilloch, and at 9.17 a train leaves Bridgeton Cross for Torrance via Maryhill, returning at 10.15 the same way, but continuing from Queen Street (L.L.) at 11 a.m. via Springburn to Kilsyth (Old) via Kirkintilloch. From Kilsyth (Old) it returns at 12.9 p.m., again via Kirkintilloch, but from Cowlairs via Springburn, from Queen Street going on Saturdays to Hyndland and on other days to Whiteinch. At 12.17 p.m. a train leaves Queen Street (H.L.) via Kirkintilloch for Kilsyth (New), Bonnybridge, and through to Larbert, whence it returns at 1.29 p.m. to Bonnybridge, staying there until 3.28 p.m., when it comes back to

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Queen Street, again via Kirkintilloch. The 1.2 p.m. from Bridgeton Cross goes to Kilsyth (Old) via Maryhill and back, as do also the 5.0 (Saturdays, other days from Hamilton), and 6.38 p.m., while the 2.41 (Saturdays only), 4.1, and 8.28 p.m. go the same way but as far as Torrance only. This leaves only the 4.35 from Queen Street (H.L.) to Bonnybridge and back, and the 7.53 p.m. terminating at the same place, all via Kirkintilloch, the 6.13 (not Saturdays) and 9.55 p.m. from Queen Street (H.L.) to Kilsyth (Old) and back, and the 10.13 p.m. on Saturdays from Bridgeton Cross to Torrance via Maryhill. A peculiar set of trains, but distinctly interesting to follow out, and over routes which are equally interesting to traverse. The route via Kirkintilloch has, beside the trains mentioned, those on the Blane Valley line and through to Aberfoyle, while as far as Maryhill there are other trains, so that it is only stations on the routes referred to beyond the terminal or diverging points of other services which are so sparingly served.

There are, of course, many other features of interest to which attention might be given, did space permit, but enough has been said to indicate the general character of the routes considered, many of which seem to be almost unknown outside the area concerned. The great characteristic of all is the frequency with which colliery activities are met with, but there is a fair proportion of the scenic element, while many other unusual and noteworthy factors render journeys over the lines mentioned both interesting and instructive.

Census of Railway Employees.

A RETURN has been issued showing (1) the number of persons employed by the several railway companies of Great Britain during the week ended March 27, 1926, and (2) a comparison of the rates of pay, and also of the average weekly salary or wage and the average weekly earnings of certain selected grades during the weeks ended March 28, 1925, and March 27, 1926.

Details are given of the number employed in each of the principal grades of the four great companies and certain other selected companies, with totals for each company and for Great Britain. Male and female employees are shown separately and with the exception of staff not employed directly, *e.g.*, staff employed by contractors, all persons in the service of the railway companies during the week of the census are taken into account. The figures comprise the number of staff receiving salaries or wages for the full week, combined with the equivalent number of full-time workers in cases where employees were paid for less than the complete week.

The following table gives the numbers employed in each of the principal grades and in ancillary businesses during the selected week in 1926, with the corresponding numbers for the selected week in 1925 :—

Male Staff.	1926.	1925.
Railway Staff :—		
Capstanmen	1,520	1,516
Carters and vanguards ..	23,148	21,888
Carriage cleaners ..	7,128	7,336
Carriage and wagon examiners	4,778	4,809
Carriage and wagon oilers and greasers	2,206	2,259
Checkers	11,406	11,219
Cranemen	549	574
Crossing-keepers ..	1,497	1,545
Engine cleaners	9,192	11,114
Engine drivers and motormen	38,679	38,292

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Male Staff.	1926.	1925.
Firemen and assistant motormen	36,405	36,359
Foremen and chargemen	7,702	7,612
Guards—goods	16,560	16,792
,, passenger	8,089	8,163
Hydraulic and pumping engine staff	1,543	1,540
Labourers	29,982	32,140
Lampmen	2,390	2,417
Loaders, callers-off, ropers, and sheeters	7,320	7,170
Locomotive shed staff (excluding labourers)	10,995	10,866
Messengers	1,202	1,905
Number-takers	2,505	2,664
Officers and clerical staff	75,950	77,118
Permanent-way men	63,588	66,480
Pointsmen	379	393
Police staff—supervisory grades	196	214
Police staff—other grades	2,581	2,751
Porters—goods	20,431	20,577
,, passenger	26,971	27,858
Porter guards	528	511
,, signalmen	1,836	1,723
Shop and Artisan Staff :—		
Supervisory grades	3,005	3,029
Other grades (excluding labourers and watchmen)	116,388	119,137
Shunters	17,941	18,055
Shunt horse drivers	679	712
Signal and telegraph men	5,672	5,722
Signalmen	28,897	29,184
Signal-box lads	1,772	1,097
Stationmasters, yard-masters, &c.	7,016	7,257
Supervisory staff (other than shop and artisan, and police)	11,753	11,935
Technical staff	2,681	2,699
Ticket collectors	4,951	5,087
Traffic control staff	1,326	1,330
Watchmen	566	579
Miscellaneous grades	11,285	11,292
Railway total	631,196	642,920
Ancillary Businesses Staff :—		
Canal staff	1,448	1,597
Dock and quay staff	15,943	16,119
Marine staff afloat	5,306	5,508
Marine and dock shop and artisan staff	4,024	4,207
Motor omnibus and passenger road vehicles :—conciliation staff—traffic department	432	399
Hotel, refreshment room, dining-car, and laundry staff	7,581	7,425
Total—Ancillary Businesses	34,734	35,255
Total—Male Staff	665,930	678,175

Female Staff.	1926.	1925.
Railway :—		
Carriage cleaners	641	786
Clerical and technical staff	9,350	9,787
Crossing-keepers	1,531	1,561
Office cleaners and charwomen	3,392	3,383
Shop and artisan staff	1,320	1,263
Waiting-room and lavatory attendants	744	773
Miscellaneous grades	438	443
Total	17,416	17,996
Ancillary Businesses :—		
Hotel, refreshment room, dining-car, and laundry staff	5,797	5,781
Marine staff	121	110
Total—Female Staff	23,334	23,887
Grand total, all staff	689,264	702,062

The average earnings of certain sections of the male adult staff were shown by the returns received to be as follows :—

	Week ended March 27, 1926.		Week ended March 28, 1925.	
Staff entered at salaried rates :—	s.	d.	s.	d.
Clerical, supervisory, &c., staff (excluding officers in receipt of £500 per annum and upwards and staff entered under ancillary businesses)	91	1	91	3
Staff entered at wages rates (excluding staff entered under ancillary businesses) :—				
Conciliation staff	67	2	67	4
Shop and artisan staff	70	2	69	11

Summary of Total Staff Employed in 1926 and 1925.

Name of Company.	At March 27, 1926.	At March 28, 1925.
Great Western	114,649	117,850
London and North Eastern	201,615	206,893
London Midland and Scottish	269,798	273,129
Southern	72,844	73,469
Cheshire Lines Committee	4,875	4,831
London Electric	6,894	6,626
Metropolitan	4,046	4,079
Metropolitan District	3,730	3,952
Midland and Great Northern Joint Committee	2,436	2,480
Somerset Joint Committee	1,409	1,456
Railway Clearing House	2,822	3,061
Other companies	4,146	4,236
Total, Great Britain	689,264	702,062

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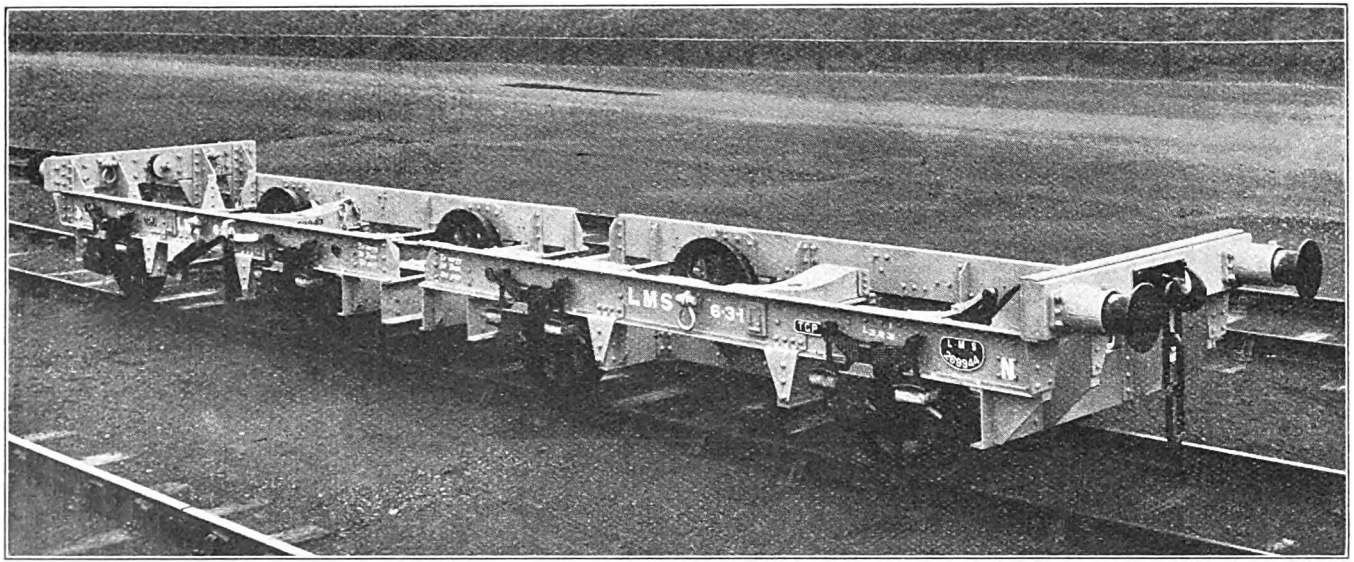
NEW 50-TON TWIN GIRDER TRUCKS, L.M.S.R.



Two new 50-ton twin girder trucks have been put into traffic by the L.M.S. Railway Company, built at the Derby Works to the design of Mr. R. W. Reid, Carriage and Wagon Superintendent. The trucks have been constructed to deal with the conveyance of girders of increasing weight and dimensions now being manufactured. Though close coupled, they may be separated and extended in order that long girders may be loaded with one end resting on the swivel bolster of either truck. The load being then securely attached to the respective trucks, forms the connection between the two halves of the twin, and the ordinary coupling is dispensed with, draw and buffer stresses going through the girder. The trucks are also adapted to carry large boilers, and other special loads.

The twin girder trucks are designed to carry 50 tons, viz., 25 tons per truck, and to negotiate a minimum curve of 1 chain. When further extended so that the centres of bolsters are 57 ft. apart they will negotiate a curve of 3 chains.

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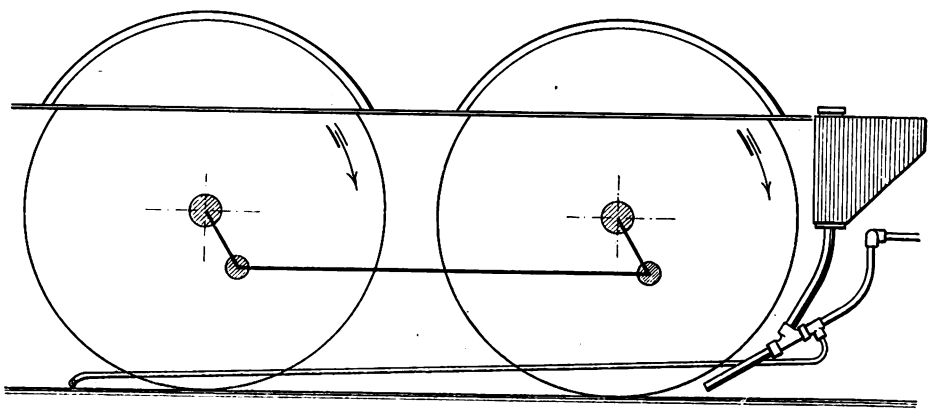
Sand and the Locomotive.

By BERTRAM JOY, A.M.I.Mech.E.

HISTORY informs us that the early locomotive pioneers held firmly to the opinion that smooth wheels running upon smooth rails represented a combination entirely unsuited to rail traction; this fact, indeed, appeared to be so obvious that, seemingly without previous experiment, locomotives were built to run with rack rails and toothed wheels, in order to drag themselves and their loads along the track. To most of us, accustomed as we are to the modern railway, the idea really appears somewhat ridiculous, and yet, when one comes to consider the extraordinarily small areas in contact between rail and tyre, even in the case of a modern six or eight-coupled locomotive, this theory of our ancestors does not appear quite so unreasonable. Rack rails, however, were soon found to be unnecessary, and one must now look for them in mountainous districts only.

With the desire for more and more speed the size of the driving wheels increased, whilst the coupling of wheels, in order to augment adhesion weight, was thought to be quite a wrong policy—where speed was concerned. In the meantime there came a public demand for more comfort, or perhaps it was the railway companies who first conceived the idea of providing more commodious and comfortable coaches in order to lure passengers from other possibilities of travel; be that as it may, certainly the weight of trains increased considerably, so much so that the combination of single driving wheels, heavy loads and, presumably, bad weather conditions (even in those early Victorian days) brought about "slipping." The writer is unaware of the precise period when slipping became so serious that locomotive engineers were faced with the alternative of fitting sanding gear or considering the unpleasant possibility of having to revert to the rack rail.

Certainly Blenkinsopp did not require sand, and Stephenson did not apply any kind of sanding gear to the *Rocket*; in the 'forties, however, and perhaps earlier,



APPLICATION OF STEAM SANDING GEAR.

numbers of engines appear to have been fitted with "hand" sanding gear. One is reminded of the fact that the first sanding must have been *literally* "hand" sanding: no doubt the drivers did actually throw sand under the wheels of a badly slipping engine. One imagines that the custom became so general that some locomotive engineer of the period spent a few minutes of his time in the drawing office, and as a result the next engine that passed through the paint shop had an additional part to receive attention—in the form of a sand-box. (It is surprising what a number of mechanical contrivances get mis-named; should not, for example, hand-sanding be more correctly called "gravity" sanding?)

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There are locomotive engineers of the greatest ability who consider hand-sanding perfectly sufficient and satisfactory, in spite of the fact that the sand does not actually get under the wheels of a stationary and badly-slipping engine and that a high side wind is likely to blow sand, falling from the sand pipe, away from the rail surface. There are others of equal ability who think that the only method of getting sand between wheel and rail is to project it there by the kinetic energy of high-pressure steam, compressed air or even water. Locomotive engineers have always and presumably will always, disagree as to the proper method of performing certain locomotive functions. Some would think that there must be a right and a wrong way of doing things in matters engineering, but a study of modern locomotive practice will prove that there is apparently room for diversity of opinion in much that pertains to the railway engine.

It has always seemed to the writer that the fact that the sand cannot be projected right under the driving wheel, or wheels, in the case of a hand-sanded engine is somewhat unsatisfactory. Drivers of such engines frequently permit a certain degree of slipping to take place without applying sand, rather than apply sand and thus increase subsequent train friction. Apparently in the case of a tank engine, where there would be sand pipes for both directions of running, it would be possible for a driver when backing on to his train to apply sand a few feet before meeting the train. If, when rails were expected to be greasy, the sand pipe nearest to the train were to be employed, there should be sand actually under the driving wheels at the moment of starting. Such a procedure might overcome one of the difficulties of hand sanding; the writer is not aware, however, whether drivers are accustomed to operate in this manner or, indeed, whether it be a practical method of employing the hand system.

There appears to be a reluctance on the part of the drivers to employ sand when getting a heavy train into motion and perhaps this may be due to the well-known fact that additional tractive effort is required to haul a train over sanded rails. Recently the writer noted a very heavy train starting on its northern journey from a London terminus and it was observed that the driver was on this occasion employing sand very generously, a proceeding that would have to be paid for later. It was not noted, however, until the disappearance of the train engine in a cloud of steam that there was a banking engine in the rear of the train which was valiantly helping to push the coaches over the well sanded rails. This question of haulage on sanded rails occupied the writer's attention a few years back when he proposed a scheme—subsequently found to have been already suggested—for removing the sand from the rails after the passage of the locomotive. The proposal was intended for employment in conjunction with steam sanding and consisted of a small pipe which carried high-pressure steam from a point close to the sand ejector to a point behind the rearmost driving wheel and adjacent to the rail. Thus whilst steam was directing sand under the leading driving wheel, this sand was being blown from the rail after the passage of the locomotive. The arrangement is sketched in the drawing reproduced herewith, further description is therefore unnecessary. The additional parts would consist of two lengths of small-bore pipe, plus a couple of iron stay brackets—but perhaps even so, the "game is not worth the candle." One must not forget, too, in discussing this matter, that sand is employed at times in bad weather to increase the effect of the train brakes; and it could not be used in this manner if it were removed from the rails immediately after the passage of the engine. At a northern country station the writer has seen a train, on an unpleasantly damp morning, run almost completely past a station platform at which it was due to stop; perhaps, if the driver had bethought him of his sanding gear he would have saved himself a reversal.

Certain engines on the London Midland & Scottish are fitted with a guard to nullify the effects of a side wind and one would imagine such an arrangement to be quite effective and satisfactory. The locomotives of the Great Western are, so far as the writer is aware, fitted throughout with hand sanding gear in its simplest, and presumably earliest, form. It would almost seem that there had been no advance in this direction for seventy years or more, and yet are not some of the

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locomotives of this company examples of all that is most efficient and up-to-date in locomotive design?

The British locomotive engineer has always possessed what one may perhaps be excused for referring to as good taste in locomotive design, and hence we have never, in this country, been compelled to regard engines having their boilers decorated with a row of pots of slightly varying shape and size. The placing of a sand box on the barrel of the boiler may be satisfactory from the point of view of bulk of material carried, and there may be advantages in the warmth of the situation, but from the decorative point of view the over-boiler position is not by any means a happy one.

It is, one imagines, the large quantity of sand that can be thus carried that justifies the raised sand box, and moreover, the continental engineer perhaps finds little room elsewhere to put his supply of sand—wheel-level being usually so fully occupied with shafts, rods, stays and all the other miscellanies that serve to make the average continental railway engine a thing of such complex appearance. Usually the British locomotive has its sand box either just above or just below the footplate and in either case the filling operation can be performed without the serious possibility of sprinkling sand over some one or other of the important working parts of the engine: sand has an advantage when friction is needed, it has none at all when friction is a quality to be avoided.

Steam sanding gear has not undergone in recent years much improvement save in but minor details, nor does one see where improvement can be expected. It might, perhaps, be possible to devise a gear that would *automatically* discharge sand whenever slipping took place, so that the matter would be out of the hands of the driver—who has, indeed, quite sufficient to occupy his attention.

It was the locomotive with the single driving wheel that made the use of sanding gear imperative, the four-coupled engine however also found it to be an advantage, and now the six and eight-coupled type of machine employs such gear; for however much the total adhesion weight, there always are occasions in the life of the locomotive when an increase of adhesion is essential and this is where sand plays so useful a part.

A SCENE ON THE MUMBLES RAILWAY.

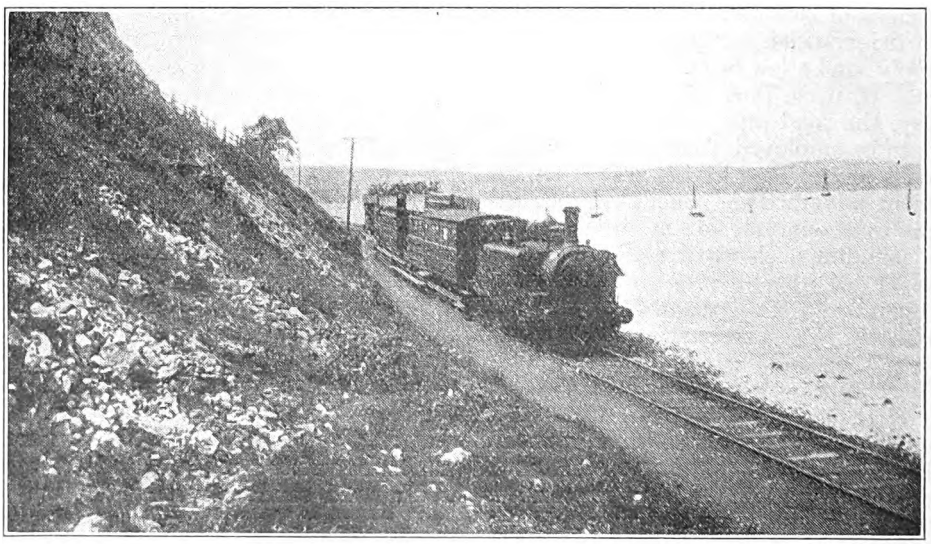

Photo.] [*G. W Tripp.*

TRAIN ROUNDING SWANSEA BAY AND APPROACHING MUMBLES PIER.

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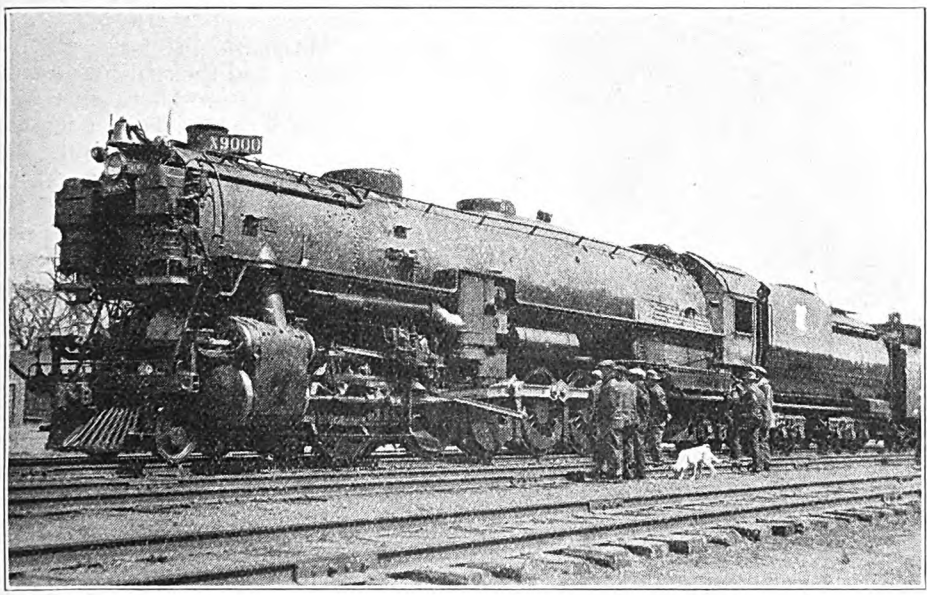
4-12-2 Locomotive, Union Pacific Railway, U.S.A.



A NOTABLE locomotive which incorporates some interesting features, new to American locomotive practice, has been recently placed in service on the Union Pacific Railway. It is the largest non-articulated steam-power unit ever constructed, and inaugurates a novel type of wheel arrangement—the 4-12-2—to be known as the "Union Pacific" type.

The first locomotive of the class is working on the western divisions of the Union Pacific between Cheyenne, Wyoming and Ogden, Utah. It has been designed to haul trains of 125 freight cars, measuring a total length of some 5,625 ft., at a maximum speed of 50 m.p.h. The Mallet type locomotives employed on these divisions are capable of handling similar trains, but at a maximum speed of 25 m.p.h. With the new engine, therefore, it is possible to move the same load in half the time, with a corresponding saving of fuel and an increase in the capacity of the railway.

An outstanding feature of the design is the use of three cylinders of cast steel, the casting being in two parts bolted together at the left-hand side of the middle cylinder. A modified form of Gresley valve motion using transverse levers, which has been adopted by the American Locomotive

PRINCIPAL DIMENSIONS.

Cylinders (three), diameter ..	27 in.
,, piston stroke (inside cylinder)	31 in.
,, piston stroke (outside cylinder)	32 in.
Wheels, coupled, diameter ..	5 ft. 7 in.
,, leading bogie, diameter ..	2 ft. 6 in.
,, trailing truck	3 ft. 9 in.
Boiler diameter outside at front ..	7 ft. 7¾ in.
,, length over tube plates ..	22 ft. 0 in.
,, height of centre from rail ..	10 ft. 7 in.
Boiler pressure	220 lb. per sq. in.
Heating surface :	
Tubes	803 sq. ft.
Flues	4,456 sq. ft.
Firebox	500 sq. ft.
Arch tubes	58 sq. ft.
Total	5,817 sq. ft.
Superheating surface	2,550 sq. ft.
Grate area	108·25 sq. ft.
Maximum tractive effort	96,600 lb.
Adhesion factor	3·66
Weight of engine and tender in working order	349 tons 2 cwt.

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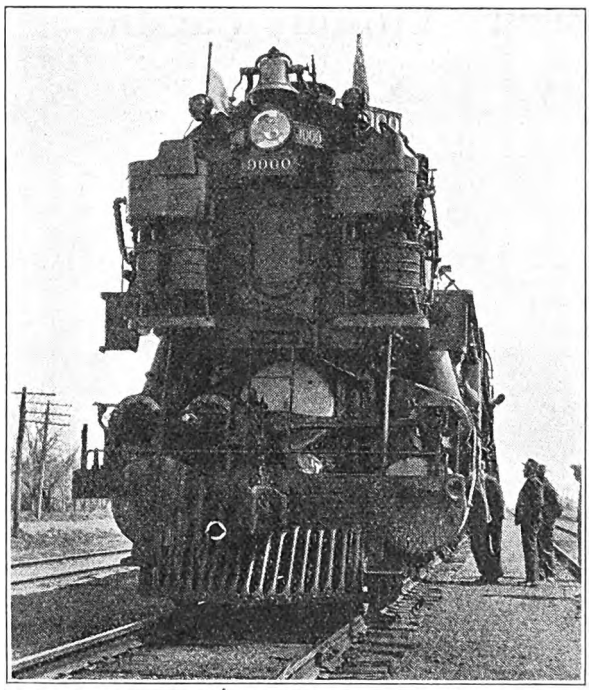
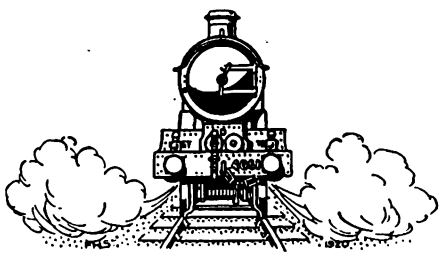


VIEW OF FRONT END.

Company as standard for three-cylinder engines, is employed to operate the valve of the middle cylinder, while Walschaert valve gear is used for the outside cylinder valves. The second pair of coupled wheels has a crank axle and is driven by the inside connecting rod. The outside connecting rods are connected to the third coupled axle. This method of transmitting power through two driving axles effects a better distribution of stresses over the whole frame structure.

Automatic stokers are employed, and the coal consumption approximates to between 6 and 7 tons per hour. The tender has a water capacity of 15,000 gallons and, in addition, carries 21 tons of coal. It will be noticed from the illustrations that the head lamp and bell have been placed high up on the smokebox front, instead of in the usual position on top of the boiler. Two air compressors are also mounted on the smokebox front, and the position usually occupied by these on one side of the boiler has been taken by the feed-water heater.

The engine was constructed by the American Locomotive Company, and represents the combined and co-operative mechanical effort of the Union Pacific Railway officials and of the American Locomotive Company. For the foregoing particulars and the photographs reproduced, we are indebted to Mr. E. B. Herdman, of Nebraska, U.S.A.



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in Spain. During trials they proved themselves capable of maintaining a speed of not less than 35 m.p.h. up a prolonged gradient of 1 in 66, with 350 tons behind the tender, and a maximum speed of 62 m.p.h. on favourable grades. These achievements are of especial note when the comparatively small coupled wheel diameter of 5 ft. 9 in., and the low grade fuel used are taken into account.

The 4-8-4 tank locomotives have been designed to handle the heavy suburban traffic around Barcelona. These engines weigh 105 tons in working order, and with coupled wheels of 5 ft. 2½ in. diameter, show rapid powers of acceleration with heavy trains.

At present 25 engines of the 4-8-2 type and 50 of the 4-8-4 tank class have been built for this railway by La Maquinstta Terrestre y Maritima, and a further 40 of the 4-8-2 type are under construction. Since 1917 a total of 193 locomotives have been built for the Spanish lines by the Maquinista Company, and it will be seen that Spain is now largely self-supporting in this important branch of engineering.

The principal leading dimensions of these 4-8-2 locomotives, known as the "1700" series, are as under :—

Cylinders(2)—	
Diameter	24·41 in.
Stroke	28 in.
Wheels—	
Driving, diameter ..	5 ft. 9 in.
Bogie, diameter ..	3 ft. 2½ in.
Trailing, diameter ..	3 ft. 9½ in.
Boiler shell, inside diameter	5 ft. 10¾ in.
Tubes—	
Large	34
Small	164
Heating surface—	
Fire-box	206·6 sq. ft.
Tubes	2,278 sq. ft.
Superheater	968·7 sq. ft.
Total..	3,453·3 sq. ft.
Grate area	53·83 sq. ft.
Weight in working order—	
Engine	101·4 tons (English)
Tender	54·93 ,, ,,
Total..	156·33 ,, ,,
Adhesive weight	63 tons.
Boiler pressure	210 lb. per sq. in.
Tractive effort at 85 per cent.	41,820 lb.
Length overall	75 ft.

NEW STATION BUILDINGS AT MARGATE WEST, SOUTHERN RAILWAY.

Photo.] [*W. Hadfield Craven.*

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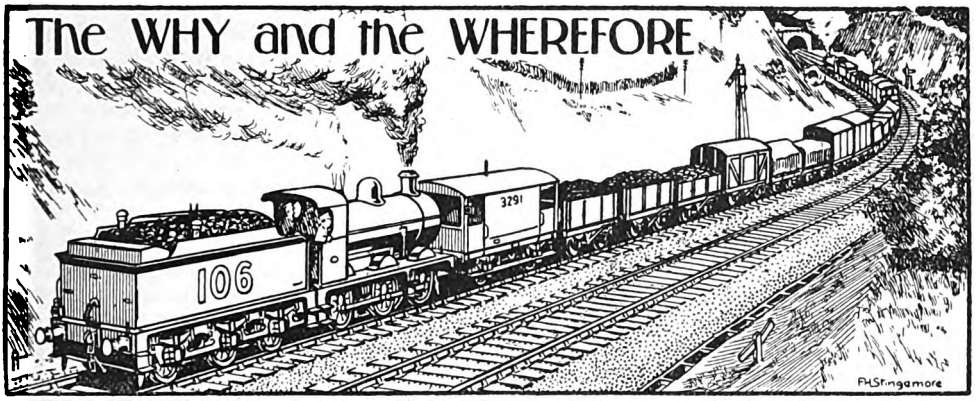

RAILWAY MAGAZINE readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o RAILWAY MAGAZINE, 33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-ninth Annual Edition (1926) of this standard railway reference work is now published. All previous Editions are out of print.

Indicative Signalling.

Without reference to the circumstances of the actual location, we cannot explain the signals shown in your sketch in detail. In principle, however, they represent an attempt to make signals as suggestively indicative as possible, in that the more important running signals are of standard sizes, with the heights varied to secure ready identification, while the smaller arms, presumably, apply to siding lines or cover subsidiary movements. In the case of the groups of small arms, the upper arm on each post would apply to the extreme left-hand direction and the others in order to the right. Signalling on the section appears to be very complex, but by considering the relations of the running lines and the sizes and varying heights of the signals, the application can usually be fairly easily followed out. We are not aware of any Great Central section locomotives working into and out of Liverpool Street. [Reply to E. P.]

Steam Raising and Boiler Pressure.

Your theory regarding the raising of steam in boilers, though expressed in somewhat general terms is quite correct. Boilers are designed to work to certain prescribed pressures. Since they are virtually closed vessels, on the application of sufficient heat, the water boils, the space above water-level becomes filled with steam and the pressure rises. Safety valves placed on the boiler are set to lift when the pressure rises above that fixed as the maximum working pressure, and the excess of steam escapes through the valves into atmosphere. From these remarks you will see that the steam pressure can only rise to the maximum working pressure, and any excess is relieved at the safety valves. [Reply to G. E. FENTON.]

Signals under Grouping.

The fact that the late Midland and London and North Western Railways now form sections of the L.M.S.R. explains why signals of North Western type are now to be found here and there on the Midland section and elsewhere, in that material originally prepared for use on one section is now available for use generally wherever required. The joint line you mention is in another category, in that the joint arrangements still apply. We do not understand your enquiry as to Midland section locomotives. Neither can we enter into the question of comparisons of locomotive power.

[Reply to S. WATTHEY.]

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Speed Comparisons.

Your comparisons of speed on different railways are hardly fair, as they take not the slightest account of the relative difficulties of grading, curvature of lines, and congestion of exits, which beset each route. These hindrances, which are severe, for example, in the case of the Eastern Section of the Southern Railway, or the Great Eastern Section of the L.N.E.R., must be given due weight in the assessing of the relative merit of train services, especially those operating over but short distances out of London.

[Reply to R. S. RUSSELL.]

Railway Level Crossing Signal Boxes.

We do not understand your inquiry, in that whether one or more signal boxes are provided where one railway crosses another on the level depends upon the circumstances of the location. One signal cabin can very well serve all purposes on both routes, but a busy centre, such as Retford, may require four or even more signal cabins to meet its traffic requirements. If one cabin controls the actual crossing, it is, of course, in communication with four other cabins, one in each direction, and we presume that is what you have in mind. [Reply to J. G. P.]

Automatic Couplings.

These are designed so that, when two vehicles are brought together, they couple automatically. To uncouple it is, of course, necessary to operate the coupling member of one or both vehicles, but this can usually be done from the side of the vehicle, thus avoiding the necessity for shunters going between. Automatic couplings can be seen in service on some of the London electric lines. They are also used for some of the special car sets on the L.N.E.R. Otherwise, they are not generally employed in this country.

[Reply to G. W. HUSSEY.]

Railway Bridges at Stonebridge Park, L.M.S.R.

Without referring to a plan showing all the siding lines in the vicinity, we cannot give you the total number of tracks involved in the bridges which span the River Brent near Stonebridge Park station, L.M.S.R. Drummond 4-4-0 engine No. E 423 is now generally used for working Royal trains on the Southern Railway, which explains why it drew the Royal train on December 6, although travelling via the Brighton route.

[Reply to J. L. SUTCLIFFE.]

Trains and Speeds on G.C. Section, L.N.E.R.

The highest speed on the Great Central Section of the L.N.E.R., which has figured in Mr. Allen's monthly articles as an authentic record, was made by the 4-4-0 engine *Mons* on the 2.32 a.m. Newspaper express from Marylebone to Sheffield, when a rate of 90 m.p.h. was touched at Braunston, as detailed in the June, 1923, issue. This train is usually worked by a "Director" 4-4-0 to Leicester, and by an "Atlantic" forward from there.

[Reply to G. C. R.]

Distant Signal Warnings in Belgium.

A series of special display boards precedes the approach to distant signals in Belgium. These are five in number and are painted white, with large black stripes bearing the indications IIIII, IIII, III, II and I in succession, the "I" being nearest to the signal. These indications, spaced about 30 ft. apart, are of great value to drivers in indicating their nearness to distant signals, especially during the fogs to which Belgium is so subject. It is doubtless to these boards that your query refers. [Reply to R. L. H.]

"Valour" versus "Claughton."

If you will consult the "Locomotive Practice and Performance" articles of Mr. Cecil J. Allen, which describe from time to time the performances of both these types of engine, you will be able to compare for yourself the "speed and general capabilities" of these two types. The limited space at our disposal here forbids of any such comparison in these columns, which are intended to give statements of fact rather than what must be matters of opinion.

[Reply to CYRIL E. CLARK.]

Moorgate and Liverpool Street Stations, Metropolitan Railway.

The track beyond the outer circle line at Moorgate has been taken up as it is no longer required. Apart from its use as a terminal platform, it gave access to a

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small shop whereby repairs and other work could be undertaken. The tunnel outside Liverpool Street station at one time accommodated tracks leading into the Great Eastern station. This has been closed and the tracks have now been taken up. [Reply to A. C.]

Articulated Rolling Stock, L.N.E.R.

Articulated suburban trains were introduced on the Great Northern Railway some six years ago. The principle was also applied to miscellaneous main line vehicles, but the Leeds quintuple set was the first main line train built as such. Duplex sleeping cars followed about four years ago, and "triplex" dining cars for Anglo-Scottish trains in 1924. We have no information as to the Continental facilities mentioned by you.

[Reply to C. A. M'LAREN.]

Southern Railway Signalling.

The booklet on "The Re-Signalling of the Southern Railway," reviewed on page 63 of the January RAILWAY MAGAZINE, has not been issued for general circulation. It is possible, however, that the Westinghouse Brake and Saxby Signal Co. Ltd. would be willing to let you have a copy on receipt of a suitably-sized stamped addressed envelope, but readers must be prepared to be told that copies cannot be supplied.

[Reply to "S.E.C.R."]

Great Northern 0-6-2 Tanks, L.N.E.R.

Certain of the original 0-6-2 tank engines of the Great Northern Section, L.N.E.R., have received superheating equipment, *e.g.*, No. 4598 (previously 1598). In these the smokeboxes are not extended, but the chimneys are set slightly further forward, and a pair of snifting-valves is mounted behind them, instead of the more customary double valve-casing. It is doubtless to these few engines that you refer.

[Reply to R. M. SOWERBY.]

L.N.E.R. "Pacifics" and Leeds.

We believe that the reason why the "Pacifics" are not allowed to work from Doncaster direct to Leeds (Central) via Wakefield has to do with clearances through Wakefield (Westgate) Station. We are aware that the "Pacifics" are worked into the Central Station at Leeds with the Pullman trains from Harrogate, and also that they work regularly between York and Leeds (New).

(Reply to H. SCOTT.]

Performance of G.W. South Wales Expresses.

From time to time Mr. Cecil J. Allen has detailed running on the South Wales services of the Great Western Railway, and although they have not been dealt with now for some time past, on account of the large amount of other topical journeys requiring description, reference will be made again to them as soon as a suitable opportunity offers.

[Reply to "TALISMAN."]

London Underground Goods Railways.

We have no further information as to the position of the proposed system of underground railways for London for goods distribution. This scheme has not been advanced by the railway companies, but is being promoted by a private concern. We cannot give a date for the inauguration of electric traction on the Manchester–Oldham route, L.M.S.R.

[Reply to F. TURNEY.]

Midland Engine at Snow Hill, Birmingham.

Midland compound 4-4-0 No. 1047, seen by you at Snow Hill Station of the G.W.R. at Birmingham, was taking part in the recent exchange trials with the L.M.S. Railway. During the week in which you saw her at Birmingham, her duty was to haul the 2.20 p.m. from Bristol to Birmingham, and the 6.35 p.m. back to Bristol via Stratford-on-Avon.

[Reply to "COUNTY CLASS."]

Highland Railway Named Locomotives.

You cannot have followed THE RAILWAY MAGAZINE very closely, in that the information asked for was published as recently as the November, 1926, issue. The "Castle" class locomotives were designed by the late Mr. Peter Drummond, and the "Clans" by Mr. Smith. Copies of the book entitled "The Scottish Railways" can still be supplied.

[Reply to "HIGHLANDER."]

Record Speeds on the L.N.E.R.

No details have ever been made public as to the running on the occasion when one

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of the Gresley "Pacifics" is alleged to have attained 89 m.p.h. at Sandy, and it is open to some doubt whether such a speed was actually attained on that occasion, although no doubt these engines are fully capable of such a speed and higher, at a suitable location.

[Reply to W. HARTLAND.]

Bogie Carriages.

Here and there bogie vehicles were used from quite early days, in the 'fifties and 'sixties, long before they became usual for standard trains in this country. Such vehicles became general in the United States fairly early, certainly in the 'fifties, where the condition of many of the original lines rendered something better than the four-wheeler imperative. We cannot, however, quote exact dates.

[Reply to J. G. DOWNWARD.]

"King Arthur" Class Locomotives and Weymouth.

We understand that "King Arthur" class locomotives have been allowed to work through to Weymouth since the beginning of November last. Prior to that, it was necessary to change engines at Dorchester, if a large engine was attached to a through train.

[Reply to R. HALKETT, JR.]

Code Letters on L.M.S. Goods Brake Vans.

In view of the changes made to secure simplification in recent years, our particulars of the system of code letters introduced by the late Midland Railway, and shown on their brake vans operating in certain districts, do not enable us to give up-to-date particulars of the system as now in use. [Reply to P. A. T.]

Kirtley Locomotives, L.C.D.R.

In a recent issue we gave particulars of London, Chatham and Dover "Kirtley" locomotives still in service. This company's works were at Longhedge, Battersea, but under the S.E. and C.R. they became only local repair shops, heavy work being done at Ashford.

[Reply to A. F. WIGRAM.]

Railways at Stratford-on-Avon.

Remains that you have noted of an old railway track in this neighbourhood, concerning which you are not very explicit, are probably portions of the old Hatton, Stratford and Honeybourne line, which were abandoned when the North and West main line via Stratford came into use.

[Reply to R. HALKETT, JR.]

Locomotive Working at Ramsgate, S.R.

So far, the direct route to Margate and Ramsgate is not adapted to take 4-6-0 locomotives. They can work over the new Ramsgate line, via Ashford, but the trains in that direction do not ordinarily call for big engines.

[Reply to "GARRATT."]

Boiler Diameter of S.R. Locomotive "Lord Nelson."

The outside diameter of the boiler at the firebox end of the Southern Railway locomotive *Lord Nelson* is 5 ft. 9 in. The inside diameter at the leading end of the boiler is 5 ft. $6\frac{1}{8}$ in.

[Reply to "GENERAL."]

Gresley Locomotives, L.N.E.R.

The boilers fitted to 4-6-2 locomotives are intended to be worked at 180 lb. per sq. in. Their design would, however, permit of an increase to 200 lb., though we have no information that any such step is contemplated.

[Reply to S. G. WILSON and J. H. BEALE.]

Wagon Descriptions.

The nicknames "Mica," "Mica B," "Hydra," "Siphon G," "Siphon H," and others, are adopted on the G.W.R. to describe different wagon types and capacities in as brief a way as possible, especially when telegraphing.

[Reply to R. C. CHALLANDS.]

Tilbury Tanks on Midland Main Line.

The circumstances indicated in your query would be governed by the particular engines stationed at Kentish Town, St. Albans and Luton, and, as these are always liable to change, we do not think it desirable to attempt to reply to questions of this kind. [Reply to W. S. B.]

L.N.E.R. 0-6-0 Locomotives.

The new engines illustrated in the December number are principally employed in the North Eastern area and in Scotland. We are not aware that, so far, any have appeared on the Great Eastern section.

[Reply to "HOCKERILL HALT."]

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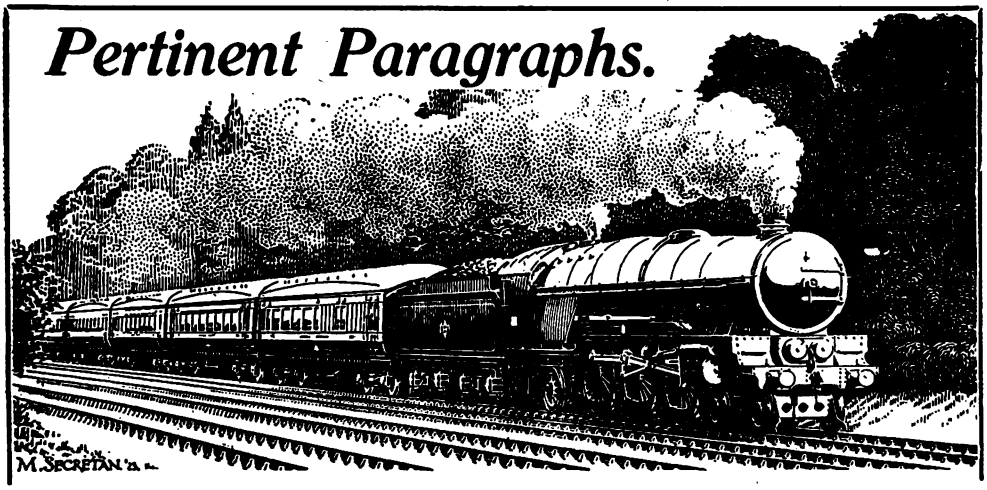
Pertinent Paragraphs.



London to Leeds by Pullman from King's Cross.

WE are indebted to a correspondent for the following analysis of 62 runs by non-stop Pullman express from King's Cross to Leeds (*en route* to the North) during the past three years, which shows a fine average of consistent fast running. The times have been authentically recorded by a frequent traveller by this luxurious and popular service under varying conditions of weather, loading, and fuel.

The timing allowed in each case for the runs under notice was 205 min. for 186 miles, equalling a throughout average of 54½ m.p.h. Owing to steep gradients and busy sections traversed near the beginning and end of the run, the schedule average speed for the major intermediate portion of the trip is necessarily higher and equals 59 m.p.h. for 138 miles from passing Hatfield to passing Doncaster. Maximum speeds of from 75 to 80 m.p.h. were attained on favourable stretches of line during most journeys, with occasional bursts exceeding 80, and a mean rate of from 65 to 70 m.p.h. was maintained for 30 miles and upwards in more than one instance.

The first series of 20 trips behind Great Northern four-coupled "Atlantic" locomotives, hauling an average of more than 340 tons, shows a mean net time to Leeds of 204½ min., or ½ min. under schedule. On two occasions only was the train more than 3 min. late in stopping at Leeds Central, while 10 out of the 20 arrivals were exactly punctual or were early.

Twenty-eight journeys with slightly heavier loads, averaging 349 tons, produced an average net time of 204 min. from London to Leeds, or 1 min. under booked time, the engines on this series being of the more modern Great Central six-coupled, four-cylinder type. Seventeen arrivals at Leeds of these 28 were punctual or early, the others suffering delays of various kinds; but in no case was an arrival of more than 5 min. late secured.

More recently, when the Harrogate and Scotch Pullmans ran separately from the West Riding service, with a lighter average load equalling 255 to 260 tons, Great Northern "Atlantic" engines on 14 runs completed the non-stop journey in an average in 202½ min. —considerably under schedule—and only three times was a slightly late arrival made in the capital of the West Riding.

The net times are arrived at after deducting a fair allowance, based on average unchecked times over a similar course, for signal, track repair, and other delays which were beyond the control of the driver. In many cases such losses of time were made up during the remainder of the run, in one case no less than 9 min. being recovered by means of a superlative performance between Grantham and Leeds. Actual loss of time by the locomotive was remarkably rare.

Proposed New Bridges for London.

THE erection of four new bridges over the Thames, the retention and widening of Waterloo Bridge, and the adoption of the Dartford-Purfleet tunnel scheme are part of the programme, involving a total expenditure of approximately £27,500,000, recommended by the Royal Commission on Cross River Traffic in London. The outstanding bridge proposals are the provision of a combined road and footway, 70 to 75 ft. wide, from Southwark Bridge to Holborn Viaduct, and a double-deck bridge at Charing Cross terminating near the Cavell statue. Under the heading "Proposed Bridge at Charing Cross," the Commission recommended :—

(*a*) A double-deck steel bridge, providing space for six railway tracks on the lower, or present level, with a 60-ft. roadway above and two footways, of 15 ft. each, should be built immediately alongside and to the east

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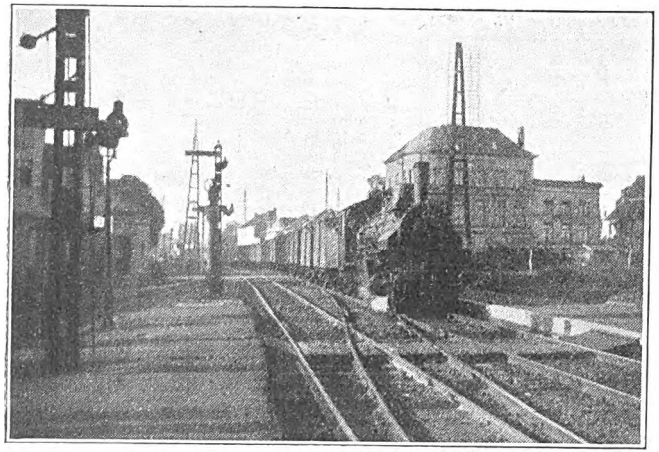
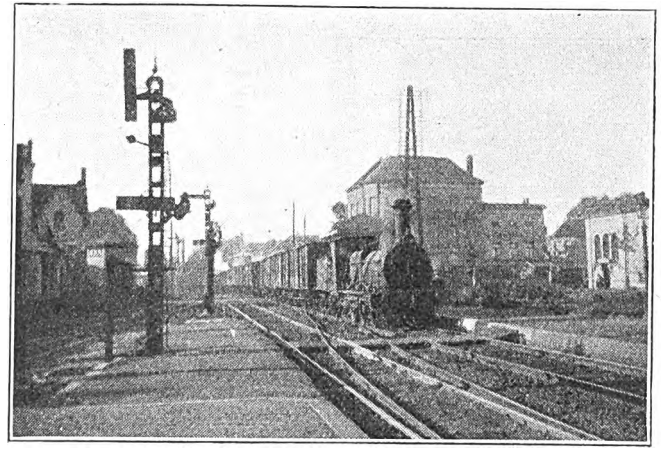
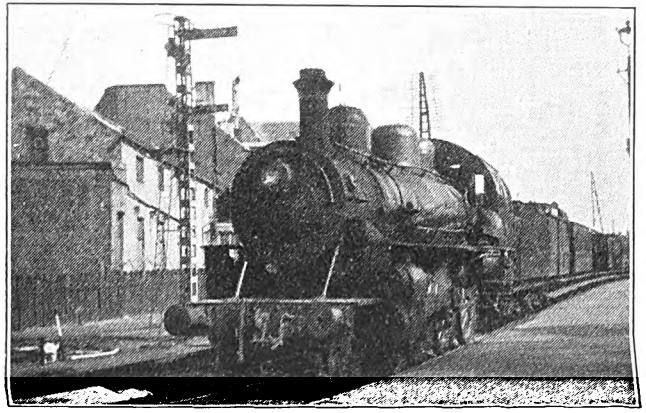


BELGIAN STATE RAILWAYS.
Goods train approaching Bruges, 2-6-0 No. 7499.



BELGIAN STATE RAILWAYS.
Goods train entering Bruges, 0-6-0 No. 585.



Photos.] **BELGIAN STATE RAILWAYS.**
Courtrai and Paris train at Ostend, 4-6-0 No. 4925.

BELGIAN STATE RAILWAYS. [*G. H. Cannon.*
Ostend (Ville) station, 4-6-0 No. [illegible]

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of the present Hungerford railway bridge, and a new Charing Cross station should simultaneously be constructed on a site to be acquired, which is bounded on the east by Buckingham Street. As soon as these become ready for use, the railway track should be switched over to them and the old bridge and station demolished.

(*b*) The roadway on the northern side of the bridge should cross over the Strand with a headroom of about 18 ft., and, passing behind St. Martin's Church, reach the ground level in the vicinity of the Cavell statue.

(*c*) The roadway on the southern side should pass by Waterloo Station, at platform level, and opposite the main entrance. The new roadway from the bridge should be built in part on the present railway viaduct (a new viaduct being simultaneously provided to maintain the railway connection with Waterloo Junction station).

It is mentioned that the Southern Railway Company informed the Commission that they had no fundamental objection to raise to the Ludgate Bridge proposal. They had gone a long way to meet the Commission's views, having agreed to dispense with St. Paul's station as a terminus while retaining it as a through station, and to abolish Ludgate Hill station. This would involve the provision of more extensive platform accommodation at Holborn Viaduct station, for which further property would have to be acquired.

The Southern Railway Company has also informed the Commission that they had no fundamental objection to the construction of a new double-decked bridge at Charing Cross, and a new terminus to the east of the existing station. The Commission state that they are confident that the co-operation of the railway company can be relied upon, and in this connection, and also as regards the Ludgate Bridge, they desire to express their sincere appreciation of the accommodating and public-spirited attitude shown by the Southern Railway Company.

Belgian Railway Notes.

MR. G. H. CANNON sends a selection of photographs taken recently in Belgium, four of which are reproduced on the preceding page. Most of his observations were made while staying near Ostend, as to which Mr. Cannon writes as follows: "There are large numbers of ex-German locomotives in use on the Belgian State Railways: 4-6-0, 4-4-2, 4-4-0, 2-6-0, 0-8-0, and 2-6-0T. Then there are some American-built locomotives—relics of the war, I suppose—4-6-0, 2-8-0, and 2-6-2T. The Dunalastair II. class 4-4-0's still exist in large numbers, Gand, especially, being one of their strongholds. As for the Belgian-designed locomotives, I saw five of the Flamme "Pacifics" on trains from Luxembourg and Cologne. The latest class of 4-6-0's are very fine. The last pre-war 4-6-0's are generally confined to the Brussels-Antwerp and Rosendaal trains, though I did see two of them recently on specials to Ostend and Blankenberghe. There are still a fair number of double-framed 0-6-0's left. The 0-6-0T's, as the 0-6-0's, have great diversity in chimneys. I saw three 2-10-0's at Schaerbeek, the big shed just north of Brussels. The only passenger tanks I saw were 4-4-2 type—two I saw at Brussels Nord, and seven at Bruges, for the Knocke and Blankenberghe branches. As for the coaching stock, bogie vehicles are rare, except on the foreign through trains, which are chiefly composed of other countries' stock. The voiture-salons and restaurant cars of Cie. des Wagons Lits are very comfortable and run well. At the present rate of exchange travelling is cheap—the first class return fare between Ostend and Brussels (75 miles each way) is 84 francs 80 centimes, being about 10s. 6d."

Victimisation of Indian Railways.

WE are indebted to the Rev. W. Machin, of Azangarh, United Provinces, India, for a cutting from *The Statesman* (Calcutta) from which the following information is extracted:—

Losses in the past, due to passengers travelling without tickets, have been so great that the East Indian Railway Company has been obliged to take special measures to combat this evil. The method adopted is known as the "crew system," and, as at present operating, a crew of ticket checkers, working under a responsible supervisor, accompanies each passenger train throughout its run. One checker is posted to each coach, and his duty is to prevent any passenger not bearing a proper ticket from entering the coach. In order to safeguard against any likelihood of the misappropriation of recoveries, and to protect illiterate passengers against the possibility of being victimised, none of the crew men, with the exception of the supervisor, is allowed to levy excess fares.

Under this system it will be possible to analyse the collections and thereby locate the stations from which passengers have been in the habit of travelling without tickets. As a result, the arrangements for booking and layout of stations, as affecting entrances to platforms and trains, can be modified or otherwise dealt with to eliminate, as far as possible, this evil, which at present is so prevalent on Indian railways.

The extent to which the fare-evading class of traveller has victimised the Indian railway companies may be judged from the fact that, during a period of six months in 1925,

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890,355 persons are known to have made their journeys without tickets. The figure for the East Indian Railway for six months ending June 30, 1926, was 50,734. Since August 1, when the new regulations were brought into operation, the receipts on the Howrah-Asansal section alone, at the end of the month, showed an increase of about Rs. 70,000.

The introduction of the "crew system" has also had the effect of considerably reducing the number of thefts from passengers, overcrowding has diminished, and the additional comfort thereby afforded for passengers on the East Indian Railway is much appreciated.

Broad Gauge Railway from Parbatipur to Siliguri.

On October 1, Sir Hugh Stephenson, Acting Governor of Bengal, inaugurated at Siliguri the first direct broad-gauge railway service between Calcutta and Siliguri. The initial step in this scheme was the completion of the Hardinge Bridge, which carries the broad-gauge line over the Ganges. This took place in 1915, and various sections have since been converted until the only portion remaining, that between Parbatipur and Siliguri, was completed in 1926, and through running of broad-gauge stock is now possible. The necessity for transhipment at an intermediate point is now removed, and the service will thus be accelerated, while, in addition, the chances of loss or damage during transit will be considerably reduced.

Formerly the Parbatipur and Siliguri line was of the metre gauge, but, later, as the cuttings, embankments and bridges were widened a mixed metre and broad-gauge was laid, and, finally, when all the necessary preparatory work was completed, the line was closed for about 24 hours, to allow of the widening of the loops at passing stations. After inspection, the line was reopened, so that trains are now able to run through from Sealdah station, Calcutta, to Siliguri, at the foot of the hills, the change-point for the Darjeeling-Himalayan Railway.

An Unusual Railway Consignment.

On Monday, November 8, the London and North Eastern Railway handled a somewhat unusual railway consignment by the transfer of Lady Rachael Byng's Angora rabbit farm from Tyneside to Windsor. A special train was made up at Hexham, consisting of :—

120 hutches containing 350 Angora rabbits loaded up in three bogie covered carriage trucks, equivalent to six ordinary carriage trucks.

50 boxes containing 50 Angora rabbits loaded in pigeon van.

Six trucks of furniture on six covered carriage trucks.

Four lift vans of furniture on four trucks.

A number of empty rabbit-hutches, benches, tools, feeling troughs, &c., on three further trucks.

Finally, a bogie brake with suitable accommodation for eight attendants who travelled with the train.

The route from Hexham was via Doncaster, Banbury, and Reading to Ascot.

The Banbury and Cheltenham Railway.

Referring to the article describing this line published in the November number, Mr. P. R. Gale sends the following further particulars, which he thinks may be of interest.

The line from Banbury to Cheltenham was not constructed as one through undertaking, but represents three separate lines as follows :—

Banbury and Cheltenham Direct Railway.

(*a*) Cheltenham (Banbury Line Junction) to Bourton-on-Water.

(*b*) Loop Kingham West Junction to East Junction.

(*c*) *Chipping Norton to King's Sutton Junction.*

Incorporated by Banbury and Cheltenham Direct Railway Act, July 21, 1873. Vested in G.W.R. as from July 1, 1897. The loop at Kingham was actually constructed under authority of G.W.R. (Additional powers) Act, 1905.

Opened :—

Cheltenham to Bourton-on-Water, June 1, 1881.

Chipping Norton to King's Sutton Junction, April 6, 1887.

"Chipping Norton" (Kingham) Loop, January 7, 1906.

Prior to G.W. taking line over they worked it under an agreement.

Bourton-on-Water Railway.

Kingham (junction for Cheltenham) to Bourton-on-Water.

Incorporated by Bourton-on-Water Railway Act, June 14, 1860, and amalgamated with G.W.R. as from February 1, 1874.

Opened March 1, 1862.

Chipping Norton Junction (Kingham)—Chipping Norton Branch.

Part of Oxford, Worcester and Wolverhampton Railway, and authorised by O.W. & W. Railway (Chipping Norton Branch) Act, July 31, 1854. Opened August 10, 1855. Became part of G.W. system as from August 1, 1863, by amalgamation into G.W.R. of West Midland Railway (into which latter system the O.W. & W. Railway had been incorporated on July 1, 1860).

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L.N.E.R. Musical Society—Carol Concert at Queen's Hall.

THE Queen's Hall, Langham Place, London, was filled with a large and appreciative audience on Saturday, December 18, when the combined choirs and the orchestra of the L.N.E.R. Musical Society gave their annual performance of carols and other music appropriate for Christmastide. The combined choirs (from London, Cambridge, Doncaster, Ipswich, Norwich, Peterborough, York, &c.) provide a body of male voices numbering about 300, while the full orchestra, which almost reaches professional standards of execution, consists of over 100. In both sections practically every person concerned is or has been in the service of the L.N.E.R., this fact, indeed, constituting a principal reason why the concerts of the Society arouse so much interest and are so keenly appreciated. Colonel W. J. Galloway, a director of the L.N.E.R., conducted as usual (except for three items taken by Dr. Adrian C. Boult, an old friend, who has on occasions rendered the Society valuable assistance), who thus took charge of the 137th, of the total of 138 concerts given, which he has conducted and for all of which he has been responsible. (He was absent once through illness.) The soloists were Miss Miriam Licette and Miss Olga Haley. Dr. Stanley Marchant (who was responsible for many of the special arrangements of selected music to suit the male voice choir, also for certain orchestral arrangements) was at the organ, while Mr. Sydney Harrington, F.R.C.O., an L.N.E.R. man, acted as accompanist, assisting also at the organ.

There was a large gathering of L.N.E.R. directors and chief officers, also those of other companies, and many well-known ladies and gentlemen.

The orchestra were responsible for the "Egmont" overture (Beethoven), a Bach Prelude and Fugue (specially arranged and very effectively rendered), Handel's famous "Largo," and a setting of Rachmaninoff's Prelude in C sharp minor. The choir rendered several chorales, a number of carols, and arrangements of several choruses from Handel's "Messiah." Although the two soloists had individual items, principal interest attached to those in which they were associated with the choir, while in the case of the more familiar carols the audience were invited to join in refrains and selected verses.

A French View of Railway Speeds.

MR. GERALD W. SPINK sends a translation of part of an article published in the November number of the French scientific monthly journal *La Science et la Vie*. This deals with railway progress in general, and in addition to some notes on the improvements in coaching stock (the latest English improvements being mentioned), extension of sleeping-car facilities to passengers travelling below first class and adoption of continuous brakes for goods trains, has something to say about electrification and train speeds. Further remarks based on this translation may be quoted as follow :—

"A programme for electrifying some 8,000 km. of line in France was held up by the war, but is now being carried out. Similar progress is being made in other countries. Electrification will permit of higher speeds in mountainous regions, but the absolute maximum of 75 m.p.h., already in force on the steam-driven lines [of France] cannot be exceeded if it is desired to diminish the dangers of derailment. To increase this maximum it would have been necessary not merely to equip the lines electrically, but to reconstruct them entirely. Every curve of radius less than 2 km. would have to be avoided, as has been proved by tests carried out at great expense some time before the war on the Marienfeld–Zossen line (Berlin area), in order to determine the features of a railroad intended to carry electric trains impelled at a speed of 124 m.p.h. But it is probable that the enormous cost of such undertakings would be absolutely disproportionate to the economic advantages which even a considerable increase of speed would procure. The maximum speed of 75 m.p.h. is not exceeded in any country in ordinary practice. At the very most, one might refer to certain American expresses which travel at 76 m.p.h. on stretches of their route, and some rare cases in which an English express has travelled at 80 m.p.h. for more than 12·4 consecutive miles."

Mr. Spink comments thus upon this: "A table of speeds is given, comparing the speeds of French trains of to-day with those of 1908; speeds have evidently been reduced, except in the case of the Paris–Calais section of the Nord line, where the quickest train is timed at 61·8 m.p.h. instead of 55·3 m.p.h. The highest scheduled speed in Germany is given as 53·4 m.p.h., between Berlin and Hamburg (journey time, 3 hours 20 minutes). The recently inaugurated 'all-Pullman' train between Paris and Calais and vice versa, which has been given the name 'Fléche d'Or' (Golden Arrow), has been known to perform the whole journey at an average of 62 m.p.h. instead of the scheduled 61·8 m.p.h. The article contains a rather curious error, however, for the 'Flying Scotchman' (*sic*) is quoted as the fastest train in the United Kingdom, with a journey time of 8¼ hours for its 395 miles and its speed of 47·7 m.p.h."

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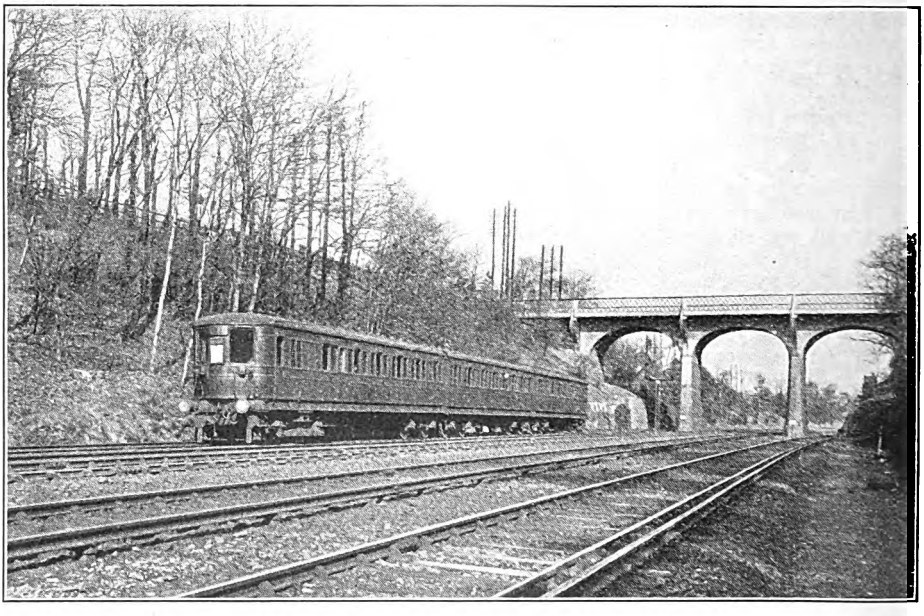
Southern Railway Suburban Electrification.

ONE of the largest contracts for complete electric railway equipments ever placed in this country has been obtained by the Metropolitan-Vickers Electrical Company in connection with the extension of suburban electrification on the Southern Railway. It covers the supply of motors, control gear, lighting, heating and braking equipment for 116 three-coach trains and 47 two-coach trailer units for passenger service on the Central Section of the Southern Railway suburban system. The value of the contract, over £600,000, is approximately the same as that of the recent contract placed with the same firm for 41 2,600-h.p. locomotives for the Great Indian Peninsula Railway. The whole of the electrical equipment for both contracts will be manufactured at the works of the Metropolitan-Vickers Electrical Company at Trafford Park and Sheffield.

The present contract, which is for the conversion of stock for the Central Section development as announced last August, is the fourth of considerable magnitude which has been placed with the Metropolitan-Vickers Electrical Company for train equipments for the Southern Railway. The first, in 1914, covered complete motor and control equipments for 84 three-coach trains constituting the initial stock for the south-western section to Shepperton and Claygate. In 1924 and 1925 control equipments and auxiliaries were supplied for 129 three-coach trains and 59 two-coach trailer units for the south-eastern section. A later contract was placed in 1925 for equipments for 26 three-coach trains and 13 two-coach trailer units for the Dorking and Guildford extensions on the south-western section. This third contract included again Metropolitan-Vickers motors, as also does the present contract.

The new equipment will be identical with that supplied on the previous contracts. Each motor coach will be equipped with two 275-h.p. motors of the totally enclosed, self-ventilating type. These machines, which are of the largest size used for motor-coach service in this country, are arranged in pairs on the bogies underneath the driving compartments at the two ends of the train unit. As with most axle-mounted motors they are four-pole machines, and have also four commutating poles and two sets of brushes.



THREE-COACH UNIT ELECTRIC TRAIN, SOUTHERN RAILWAY, NEAR SURBITON.

The control gear is of the Metropolitan-Vickers all-electric type, with automatic acceleration and arranged for multiple unit working. The main contactors are operated by solenoids energised from the line and controlled through train lines connected to the master controller in the driver's cab. The master controller incorporates the "dead-man handle" gear.

It is of special interest to note that the maintenance cost on the equipment already installed, much of which has been in con-

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tinuous service for periods up to 12 years, has been extremely low, probably the lowest for any railway in the world.

Light Engine Collision near Leeds, L.N.E.R.

MAJOR G. L. HALL's report to the Ministry of Transport in regard to the collision which occurred at about 7.15 a.m. on September 18 at Wortley East Junction, between Armley and Leeds, L.N.E.R., has been issued.

The collision was one between a light engine and a passenger train. The latter, the 6.38 a.m. from Bradford to Leeds, was running through the junction under clear signals when it came into collision with the light engine, which was standing over the points leading from the up main to the up goods line waiting to set back into the locomotive shed on the other side of the railway. The train was travelling at a considerable speed, and it is fortunate that personal injuries were less serious than might well have proved to be the case. Thirteen of the passengers complained of shock or injury. Of the Company's servants, both drivers and firemen were injured, and the guard of the passenger train complained of shock. The most seriously injured were the driver and fireman of the passenger train, and both they and the fireman of the light engine were still confined to bed at the time of the inquiry. Both engines were extensively damaged, as also were the coaches, particularly the first four, one compartment in the leading third brake being broken in and wrecked. The damage to the permanent-way was considerable, and included the bending and displacement of eight lengths of rail.

The light engine was No. 6104, 4-6-0 type, with six-wheeled tender, weighing in working order 119 tons. It stood with the chimney facing the oncoming train. The passenger train was drawn by tank engine No. 4549, weighing 62½ tons, of the 4-4-2 type, running bunker first. The train consisted of five coaches, the first two and last two being of the articulated bogie type and the centre vehicle a six-wheeled third-class carriage. The train and engine were fitted throughout with the vacuum brake, which was only applied a second or so before the collision occurred. Responsibility for the accident is attributed to signalman Wheeler, who incorrectly assumed that the light engine had gone to the goods line clear of the main line when he allowed the passenger train to approach.

Naworth Level Crossing Accident.

LIEUT.-COLONEL A. H. L. MOUNT'S report to the Ministry of Transport on the fatal level-crossing accident which occured on August 30, at Naworth, has been issued. It will be recalled that as the 1.18 p.m. express from Newcastle to Carlisle, drawn by 4-4-0 locomotive No. 1929, was running through Naworth it came into disastrous collision with a road motor coach which had been erroneously permitted to pass over the station level crossing. Including the gate-keeper, who was himself killed, nine deaths resulted, three other people being seriously injured. Responsibility for the accident is placed upon the gateman who was killed. As the report points out, although signals and gates were not interlocked, the equipment at Naworth is held to have been sufficient in the hands of a man who obeyed instructions, the comment being added that there is no safeguard against human failure such as occurred on this occasion, and may equally occur in the future where similar arrangements exist. Allowing for the fact that the Newcastle and Carlisle line was constructed before the Board of Trade was given powers in regard to inspection and the imposition of special safeguards—which explains why Naworth was one of the few places not equipped on modern lines—Lieut.-Colonel Mount suggests that, having regard to the nature of the road and rail traffic, the other duties devolving upon the gateman, and the general situation of this crossing, its equipment should be brought into line with modern practice, the gates closing in sympathy alternatively across the road and the railway—their normal position being the former—with signals suitably interlocked. Other suggestions include the installation of track circuit or other device for the operation of a warning gong, or alternatively, to the use of a bell code by the gate-keeper for obtaining definite permission from the signalmen on either side to open the gates for road traffic.

Southern Railway Programme for 1927.

DESPITE the serious effect the labour troubles of 1926 have had on railway receipts, the Southern Railway will continue its many important reconstruction and development works for 1927 now in hand, and announces additional important schemes for which authority has been obtained or will be asked in the near future. The programme of construction is as follows :—

1. *Works already in hand.*

(*a*) The electrification on the third-rail system of the suburban lines in the Central Section now operated by steam, details of which have already been announced. To cost £3,750,000.

(*b*) The reconstruction of Dover Priory station and the demolition of the old Harbour station ; removal of part of the Archcliffe Fort with the object of doubling and improving the line into the Marine station over which the Continental boat expresses pass ; building of a new locomotive shed and the provision of additional

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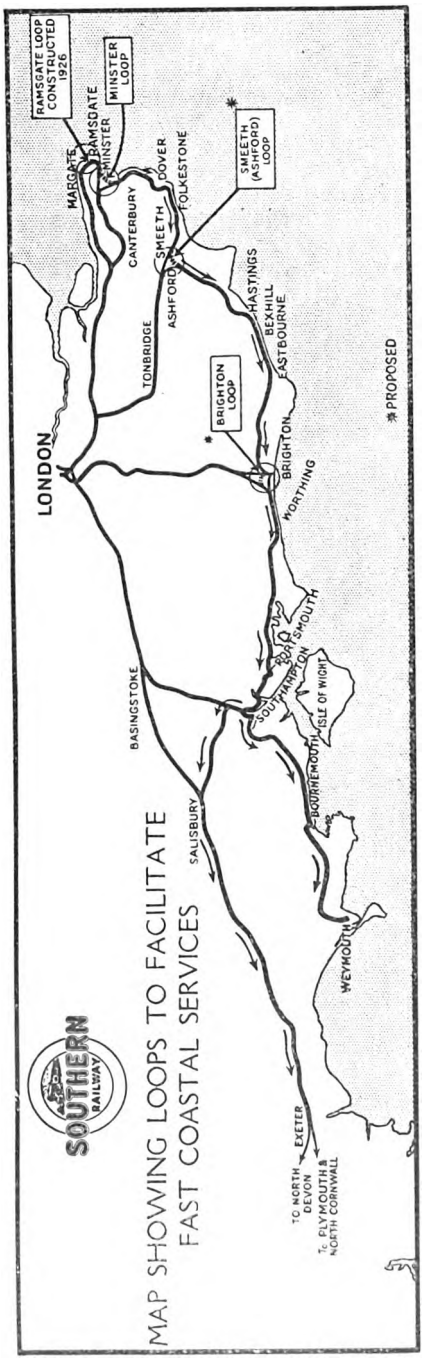
siding accommodation for dealing with local traffic; the rebuilding of the customs and transit shed at which all imported and exported Continental goods are dealt with. Total estimated cost of these works, £421,000.

(*c*) New station at Wimbledon, details already announced. To cost £250,000.



MAP SHOWING NEW LOOPS AND EXISTING FACILITIES FOR COASTAL SERVICES, SOUTHERN RAILWAY.

(*d*) A loop connecting the old L.C. & D. Line from Victoria with the old South Eastern line from Charing Cross between Strood and Chatham, to enable heavier engines to be employed on the express services between London, Margate and Ramsgate. Estimated cost, £81,000.

(*e*) Improvements in the Isle of Wight, as follows:—

Reconstruction of Newport station; to cost £25,500.

Doubling of line between Brading and Sandown to handle summer traffic more expeditiously; to cost £28,000.

Improvements at Smallbrook Junction near Ryde and at Haven Street; to cost £7,500.

2.—*Works authorised and to be taken in hand in* 1927.

(*a*) Southampton Docks Extension Scheme, making available considerable new space for berthing the world's largest liners and for dealing with increased freight cargoes, besides providing land for factories and warehouses on a large scale. Authorised expenditure to date, £3,000,000.

(*b*) Loop at Minster Junction; estimated cost, £35,500. This, with the loop recently provided between Broadstairs and Ramsgate, will enable through trains to be run from Margate and Ramsgate to Dover, Folkestone and Ashford without reversal of locomotives. As will be seen from the map attached, these loops are part of an important scheme to enable express services to be operated from east to west and west to east along the south coast, in conjunction with which it is hoped at a future date to construct a similar loop at Smeeth, near Ashford (Kent), continuing the route to Hastings, Bexhill and Brighton, with a further loop at Brighton, continuing the route to Portsmouth and thence via Southampton to Bournemouth, or via Salisbury to Exeter and the West of England.

(*c*) New carriage-cleaning sheds at Victoria and Clapham Junction; to cost £160,000.

(*d*) Improvements and alterations at Seaton Junction (Devon); to cost £46,000.

(*e*) Re-arrangements at Eastbourne station; to cost £30,000.

(*f*) New station at Epsom, details already announced, £90,000.

3.—*New Works, Plans for which will be submitted to the Directors for approval during* 1927. *Widenings, &c.*

(*a*) New loops and fly-overs at Lewisham Junction and Ladywell to facilitate working of goods traffic to and from the northern companies' lines via Hither Green sidings.

(*b*) Widening of the line between Kent House and Beckenham to allow the running of through electric services between Beckenham and Victoria via the Crystal Palace.

(*c*) Widening of the main line between Haywards Heath and Wivelsfield at the junction of the routes to Brighton and Eastbourne.

Plans will also be submitted for alterations to various stations on different parts of the system.

In addition to the above new works of all kinds, the following locomotive, carriage and

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wagon programme will be proceeded with in 1927 :—

(*a*) *Locomotives.*
10 express engines 4-6-0 type, " King Arthur " or " Lord Nelson " class.
5 goods engines, 4-6-0 type.
20 passenger tank engines, 2-6-4 type, " River " class.
8 shunting engines, 0-8-0 type.
(*b*) *Coaching.*
70 bogie corridor carriages.
(*c*) *Wagons.*
1,400 12-ton open goods wagons.
100 cattle wagons.
Total cost about £700,000.

As with previous Southern Railway construction programmes, it is hoped to place every contract with British firms, and the money expended will mean employment for British workmen, skilled and unskilled, for some considerable time.

Locomotive Developments at Crewe, L.M.S.R.

Of the forty 2-6-0 mixed traffic engines now building at Crewe for service on this section, the first six engines, Nos. 13030–5, have been completed and turned out unpainted. At present they are working from the Crewe South shed and after being broken-in will be allocated to other sheds. Further 0-6-0 superheater goods engines have been delivered to Crewe from outside firms, viz., Nos. 4397–4402 ex North British Locomotive Company, and Nos. 4341–7 ex Kerr, Stuart & Co.

" Precursor " class 4-4-0 No. 2017 *Tubal* (now L.M.S. No. 5244) has been converted to " George the Fifth " class (superheater), while class " C," 0-8-0 No. 2541 (now L.M.S. No. 8953) has been converted to class " G1 " (superheater) and provided with a standard Belpaire boiler. Several additional " Claughtons," fitted to burn oil fuel, have recently appeared in service, including Nos. 194 and 986. (Apparently these have taken the place of a similar number of " Princes " which are now reconverted to burn coal.)

Special D.X. goods No. 3274 and ex N.L.R. 4-4-0 passenger tank No. 2856, have been withdrawn from service. Of the former type, there are now only 23 examples left, including four which have so far received their new numbers. The full list is as follows :—Nos. 3002, 3025, 3040, 3069, 3074, 3085, 3106, 3117, 3130, 3137, 3288, 3309, 3310, 3331 (built 9/58), 3359, 3402, 3430, 3517, 3552 ; also L.M.S. Nos. 8015, 8019, 8029, and 8064 (old Nos. 3008, 3273, 3090 and 3436 respectively).

Named Expresses on the L.N.E.R.

Although " The Flying Scotsman," the 10 a.m. ex King's Cross, is the main express on the L.N.E.R. for which a particular name has been recognised, it has been usual for a long time to refer unofficially to certain other trains by generally descriptive titles. Hence the policy of naming principal express trains, applying as from January 1, may be regarded partly as systematising such unofficial references, and partly as recognising and cultivating the wide public interest which is taken in express train running. For example, since there have been two Pullman car expresses it has not always been a simple matter to indicate which was meant, so that the adoption of " West Riding Pullman " for the 11.10 a.m. down, and " Harrogate-Edinburgh Pullman " for the 11.20 a.m., with the corresponding return services, simplifies matters considerably. Similarly, the principal night Scotch expresses are to be known as the " Highlandman " in the case of the summer 7.25 p.m. sleeping-car Highland train, while the Aberdeen section at 7.30 p.m., also the winter combined train at 7.40 p.m., is to be the " Aberdonian." The 10.25 p.m. will be the " Night Scotsman," while the summer Scarborough express at 11.50 a.m. non-stop to York, will be appropriated, the " Scarborough Flier."

Flushing Continental Service.

As from January 1 last, the Flushing services operated by the Zeeland Steamship Company have been transferred from Folkestone to Harwich. The service dates back to 1875, and until 1911 was operated via Queenborough, the London, Chatham and Dover Railway, and its successor, the South Eastern & Chatham, running special boat trains to and from the pier station at that port. In the latter year the service was transferred to Folkestone, and the boat trains in connection therewith leaving Victoria at 10 a.m., due Folkestone Harbour 11.42 a.m., returning at 6.5. p.m., due in London 8.10 p.m. The boat train now leaves Liverpool Street station at 10 a.m. for Harwich (Parkeston Quay), due 11.25 a.m., the return train leaving at 6.10 p.m., due in London 7.45 p.m. An interesting point is that the transfer of the Flushing service to Harwich concentrates upon the L.N.E.R., the two principal London–Continental services via Holland, so that while the Zeeland Company's boats will provide the day service (a new feature for the L.N.E.R.), the L.N.E.R. Hook of Holland service will supply that at night. Both have widespread Continental connections, with through carriages on several routes. We may point out that although the Flushing service is transferred from the Southern to the L.N.E. Railway, the former still operates the Gravesend–Rotterdam service to Holland, in conjunction with its numerous Continental facilities via Calais, Ostend and Boulogne.

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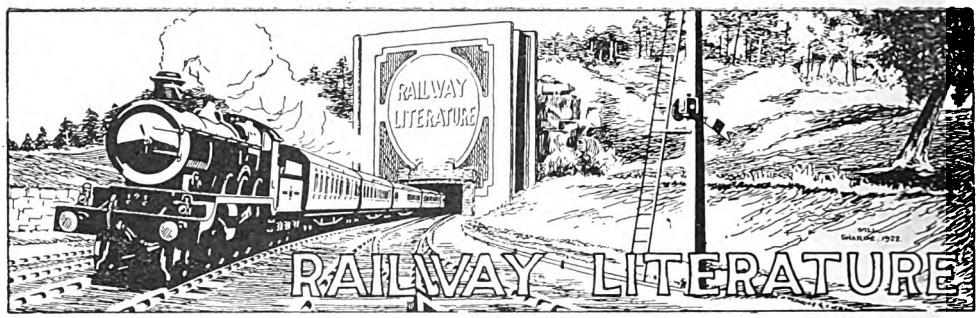

WHITAKER'S ALMANACK FOR 1927. London: 12, Warwick Lane, E.C. Price 6s. net. Abridged edition, 1s. 6d. net.

This, the fifty-ninth annual issue of this indispensable publication, has been entirely rearranged and for the future will be known as the "Complete Whitaker," in order to distinguish it from the newly established abridged edition. It is hoped that an examination of the table of contents will justify the rearrangement under which the sections are now presented, and it is believed that the references and cross-references contained in the index will enable even the most impatient of inquirers to obtain the information required with the minimum of delay. The abridged edition is a new book, replacing the Popular Edition, which is no longer issued. It differs from the book it replaces in many particulars, but principally in containing not merely a part of the Complete Edition, as was the case with its predecessor, but an abridgment of the whole, as its name implies.

RONEO, LIMITED, of Roneo Building, 5-11, Holborn, London, E.C.1, send a copy of the 1927 edition of the Roneo Index Diary. This is a nicely bound volume, admirably suited for desk use, and has the further advantage that projecting tabs enable any particular month to be turned up very conveniently, while the individual pages have their outer edges indented and numbered so that any particular day can be equally conveniently referred to. There is, indeed, a great deal to be said for this type of diary. The volume is strongly bound, and copies can be obtained from the firm mentioned at 7s. 6d. each.

MESSRS. BASSETT-LOWKE, LIMITED, of Northampton, send a copy of the new edition of catalogue Section S, dealing with sailing boats, power boats, ships' fittings, &c. In addition to serving the purposes of a catalogue with prices, the section includes many useful drawings, a number specially prepared for this edition. Copies can be had, price 6d., either from Northampton or from the showrooms in London and Edinburgh.

MESSRS. BRUNTON'S WIRE ROPE WORKS, Musselburgh, Scotland, send a small booklet dealing with wire rope for cranes. This gives the actual breaking strain guaranteed on each size and construction of rope, and what they consider to be the proper working load. Particulars are also given as to the proper groove diameters for various sizes of rope. The firm mentioned will be pleased to send a copy to any reader interested.

THE WELIN-HIGGINS CO., LTD., of Morley House, 314-322, Regent Street, London, W.1, send a neat and artistic wall calendar faced with "Fabrikoid" leather cloth, and with side panels, and containing a series of overlapped specimens representing various surfaces, markings and colours, in which "Fabrikoid" can be supplied.

MESSRS. WATERLOW & SONS, LTD., send a neat and well-produced wall calendar for 1927. It is headed by a photogravure of a painting, by Hunter, in the Tate Gallery. This is placed within an artistic frame on a grey card, which also carries the tear-off calendar below.

THE CIRCULAR BOX COMPANY, of High Street, Wandsworth, S.W.18, makers of circular boxes, postal tubes, &c., send a wall calendar for 1927. This is of the type showing a month on each sheet, headed in each case by an interesting view reproduced in colour.

MESSRS. RICHARD TILLING, of 106, Great Dover Street, London, S.E., send a copy of their 1927 calendar.

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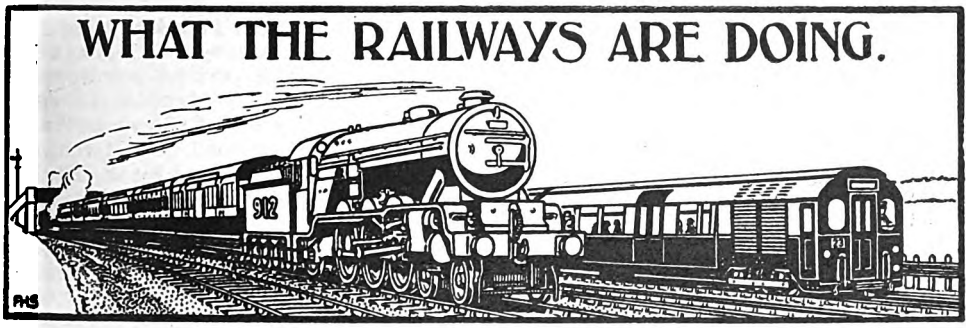
WHAT THE RAILWAYS ARE DOING.



MR. R. H. SELBIE, General Manager, Metropolitan Railway, has been unanimously elected Chairman of the General Managers' Conference of the Railway Clearing House for the year 1927.

* * *

MR. E. J. H. LEMON, O.B.E., who has been appointed Carriage and Wagon Superintendent, L.M.S.R., in succession to Mr. R. W. Reid, C.B.E., appointed Vice-President for Works and Ancillary Undertakings, has held the position of Divisional Carriage and Wagon Superintendent, Newton Heath and Earlestown, since January 1, 1925. Prior to this date he had been Divisional Carriage and Wagon Superintendent at Derby from March, 1923. Mr. Lemon entered the service of the Midland Railway Company in August, 1911, and was appointed Works Manager at Derby in January, 1917, which position he continued to fill until appointed Divisional Carriage and Wagon Superintendent, Derby, on the formation of the L.M.S.R., in March, 1923, as mentioned above. Mr. Lemon was awarded the O.B.E. for Government work done in the Carriage and Wagon Department of the Midland Railway at Derby.

MR. E. J. H. LEMON, O.B.E.,
Carriage and Wagon Superintendent, L.M.S.R., as from January 1, 1927.

* * *

MR. E. J. NEACHELL, who has retired from the position of Engineer and General Manager of the Liverpool Overhead Railway, which he had held since 1908, following his appointment as Assistant Engineer in 1903, served an apprenticeship, commencing in 1890, with the Electric Construction Co. Ltd., Wolverhampton. He was later engaged in the Testing Department and on various contracts until, in 1901, he was appointed as engineer on the London staff of Dick, Kerr & Co. Ltd., in connection with lighting and power installations in various parts of the country. This led to his appointment as Assistant Engineer to the Liverpool Overhead Railway in 1903, as above mentioned. During Mr. Neachell's tenure of office as Engineer and General Manager of the Liverpool Overhead Railway many important developments and improvements have been carried out. He has now retired on account of continued ill-health, but his services are being retained in the capacity of Consulting Engineer. Mr. W. L. Box, who has been Assistant Engineer under Mr. Neachell for several years, has been appointed Engineer, while Mr. W. T. D. Grundy has taken the position of General Manager.

* * *

MR. J. H. SMITH, Assistant to the Rates Assistant to the Chief Goods Manager, G.W.R., has been appointed Assistant Goods Manager (rates), vice Mr. F. B. Mortimore, retired.

* * *

WE learn with regret of the death of Mr. Thomas Henry Ward, formerly Stores Superintendent, Midland Railway, which occurred on November 28, aged 53 years. He entered that company's service as a boy and passing through various positions was appointed by the Board of Directors to be Acting Stores Superintendent in March, 1917, on the retirement of Major L. Sandwith, and a year later was made Stores Superintendent. On the formation of the L.M.S. group, January 1, 1923, Mr. Ward received the appointment of Divisional Storekeeper (Midland Division),

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Elliott] *[& Fry.*

MR. W. T. D. GRUNDY,
General Manager, Liverpool Overhead Railway.

and for reasons of health retired at the end of June, 1925, after 38 years' service.

* * *

A CABLEGRAM from South Africa announces the death of Mr. Frederick Dawson, formerly Secretary and General Manager of the Londonderry and Lough Swilly Railway. The late Mr. Dawson spent the whole of his Irish railway life on the staff of the line of which he eventually became principal executive officer. He resigned the position of Secretary and Manager in 1901, to take up a railway appointment in South Africa, and, except on a couple of occasions when he visited his native city of Londonderry, he remained in the country of his adoption. About two years ago, when the Government took over the Cape Central Railway, of which he was manager, Mr. Dawson retired on superannuation.

* * *

MR. W. T. D. GRUNDY, who has been appointed General Manager of the Liverpool Overhead Railway, in succession to Mr. E. J. Neachell, who has retired from the position of General Manager and Engineer, had been General Manager and Accountant of the Derwent Valley Light Railway since August, 1914. Mr. Grundy entered the service of the late Midland Railway Company at Bingley, in Yorkshire, where he received a thorough training in passenger and goods work. From there he was transferred to the District Manager's Department at Leeds, in October, 1903, and appointed a Relief Clerk. In 1911 he was made Chief Clerk at Morecambe, London & North Western & Midland joint station, from which post he was appointed General Manager and Accountant of the Derwent Valley Light Railway in August, 1914, as above mentioned. In March, 1920, Mr. Grundy was nominated by the Rt. Hon. Sir Eric Geddes, then Minister of Transport, to a Committee to examine and report upon the future policy and development of light railways, operation and construction in the United Kingdom. He is a Director of the Sand Hutton Light Railway, for the construction of which he was largely responsible. His appointment as General Manager of the Liverpool Overhead Railway dates from November, 1926.

* * *

MR. W. L. BOX, who has been appointed Engineer to the Liverpool Overhead Railway, in succession to Mr. E. J. Neachell, obtained his early experience on the Waterloo & City Railway (now included in the Southern Railway system), where he was engaged from 1898 until 1901, as Shift Engineer during the last year. He then entered the service of Dick, Kerr & Co. Ltd., at Preston, and in subsequent years held the position of Resident Engineer on the following undertakings: 1901, Portsmouth Tramways Generating Station; 1901, Great Grimsby Tramways Generating Station; 1902, electrical re-equipment of rolling-stock on the Liverpool Overhead Railway; 1903, L.C.C. Tramways Generating and Sub-station plant; 1904-06, Singapore Tramways Generating Station; and 1907-10, Generating Plant, British

MR. W. L. BOX,
Engineer, Liverpool Overhead Railway.

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Aluminium Company's hydro-electric scheme at Kinlochleven, Scotland. In 1911 he was appointed Assistant Engineer to the Liverpool Overhead Railway, under Mr. Neachell, whom he now succeeds.

* * *

In connection with their Scheme of Reorganisation and the retirement of Mr. Donald A. Matheson, Deputy General Manager (for Scotland), and of Mr. J. J. Haining, Secretary to the Scottish Local Committee, the London Midland & Scottish Railway Company have appointed Mr. Thomas H. Moffat as Managerial Representative for Scotland and Secretary to the Scottish Local Committee.

* * *

Mr. Moffat was born in 1888, and received his early railway training in the Accountant's Department of the Caledonian Railway. After a few years in the Accountant's Office, he was transferred to the General Manager's staff, and in 1912 was appointed General Assistant to the General Manager, whose Personal Assistant he became at the beginning of the war. In 1916 Mr. Moffat inaugurated and took charge of the Financial and Statistical Section of the Caledonian Railway, and when the Railway Executive Committee appointed a Statistical Committee three years later, he was nominated as the representative on that Committee for all the Scottish railways. In 1922 he was appointed Principal Assistant to the General Manager,

MR. T. H. MOFFAT,

Managerial Representative (Scotland) and Secretary to Scottish Local Committee, L.M.S.R.

who subsequently became Deputy General Manager (for Scotland) of the London Midland & Scottish Railway. During the period of Government control, Mr. Moffat was responsible for all questions connected with the control of the Caledonian Railway. Mr. Moffat is a native of Glasgow.

* * *

Mr. A. P. Ross, M.Inst.C.E., who has been appointed Manager (in succession to the late Mr. W. H. Oates) to the Cheshire Lines Committee, retaining also the position of Engineer which he has held since 1917, is the eldest son of Mr. Alexander Ross, P. Pres. Inst.C.E., and late Chief Engineer to the Great Northern Railway. He was educated at Manchester Grammar School, and at the University College, London. Before taking up the appointment as Engineer to the Cheshire Lines Committee at Liverpool in 1917, he was Assistant to Mr. Marriott on the Midland & Great Northern Joint Railway, and afterwards on the South Yorkshire Joint Railway, and in 1912 became the Assistant Engineer to the Great Northern Railway, King's Cross Station, London.

* * *

Mr. T. R. Smith, who has been appointed Secretary, Cheshire Lines Committee, in succession to the late Mr. W. H. Oates, entered C.L.C. service as station master's clerk at Stockport. Shortly afterwards he was transferred to the Secretary's Office of the Manchester, Sheffield and Lancashire

MR. A. P. ROSS, M.Inst.C.E.,

Manager and Engineer, Cheshire Lines Committee.

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Railway in Manchester. On the death of Mr. Edward Ross, in 1892, and the appointment of Mr. Glegge Thomas as Secretary to the Cheshire Lines Committee, Mr. Smith was appointed to the latter's staff. In 1916 he was appointed Chief Clerk to the Chief Cashier, and on the appointment, in 1922, of the late Mr. Charnley as Secretary and Manager, Mr. Smith was made Secretarial Assistant, which post he held also under the late Mr. W. H. Oates.

* * *

AT a meeting of the Traffic Officers' Committee, held in the Irish Railway Clearing House on December 8, Mr. Wm. Bailey, Traffic Manager of the Great Northern Railway (Ireland), was unanimously elected Chairman of the Irish Traffic Officers' Committee for the year 1927, and a vote of thanks was passed to Mr. W. F. Minnis for his services as Chairman during the year 1926.

* * *

SIR FELIX J. C. POLE, General Manager, Great Western Railway, has accepted the Chairmanship of the Board of Management of the Railway Benevolent Institution for 1927. The 69th anniversary dinner will be held at the Hamilton Hall, Great Eastern Hotel, Liverpool Street Station, on Tuesday, May 17 next, and we understand that the Right Hon. Lord Aberconway, P.C., Chairman of the Metropolitan Railway Company, will preside.

* * *

MR. WILLIAM THOMAS, who retired from the position of Chief Inspector, Great Western Railway, at the end of last year, has during the last 20 years been in charge of all Royal train journeys on the Great Western system, and in that capacity has been in receipt of various presentations, appreciative letters and signed photographs from King George, the Prince of Wales, the Duke of York, and other members of the Royal family. During his long service, which covers 53 years, Mr. Thomas has travelled over a million and a half miles on duty, and has officially visited every station on the Great Western Railway. As a lad on leaving school he made his first railway journey in 1874 from West Wales to Paddington, to pass his entry examination for the railway service. Since then there is no grade, operative or supervisory, that he has not filled in the Traffic Department. He has served under five Great Western Chairmen, seven General Managers and six Superintendents of the Line. When he first joined the service there were no corridor trains, steam heating, dining cars, or slip coaches, and the block signal telegraph system and signal interlocking were in their infancy. Among other events, Mr. Thomas was present at the opening of the Severn Tunnel in 1885, and was associated with the conversion from broad to narrow gauge in 1892, which marked an epoch in the annals of the G.W.R.

* * *

THE Directors of the L.M.S.R. have sanctioned the following appointments:—

Mr. C. Lott, Goods Agent, Widnes Dock, to be Goods Agent, Wigan.

Mr. J. Rylance, of Runcorn, to succeed Mr. Lott as Goods Agent, Widnes Dock.

Mr. F. J. Lockton, Outdoor Assistant, C. & W. Department, Crewe, is transferred to a similar position in Glasgow.

Mr. T. W. Dunn is appointed Assistant to Chief of Police, Euston.

* * *

WE regret to record the death, on December 25, at a nursing home in Leeds, of Mr. Oswald Sanderson, of Hessle Mount, East Yorkshire, aged 63. Mr. Sanderson was elected a Director of the old North Eastern Railway Company in 1910, and had been a Director of the London & North Eastern Railway Company since its formation in 1923.

* * *

WE regret to have to announce that Mr. L. M. Ericsson, the Swedish telephone engineer and manufacturer, died on December 17. Mr. Ericsson was the founder in 1876 of the organisation bearing his name, and was the world's pioneer manufacturer of the commercial telephone.

* * *

THE task of remodelling the interior of Bond Street station, Central London Railways, is nearly complete, and work has now commenced on the building of an entirely new station front. This will be of similar design to the new stations on the Morden line, of Portland stone with grey granite bases and bronze facings. Flood lighting, also, will be installed, and when finished, this station will rank among the smartest and most up to date on the whole system. It will be equipped with passimeter booking booths and the latest electrical ticket-issuing machines.

* * *

PARIS advices state that, by the generosity of an unnamed American gentleman, a building is to be erected at the cross-roads in the forest of Compiègne, where the Armistice was signed on November 11, 1918, to accommodate the railway saloon in which the ceremony took place. This vehicle is at present in the Invalides Museum, Paris.

* * *

THE first section of the underground railway at Sydney, New South Wales, was opened on December 22, trains running from

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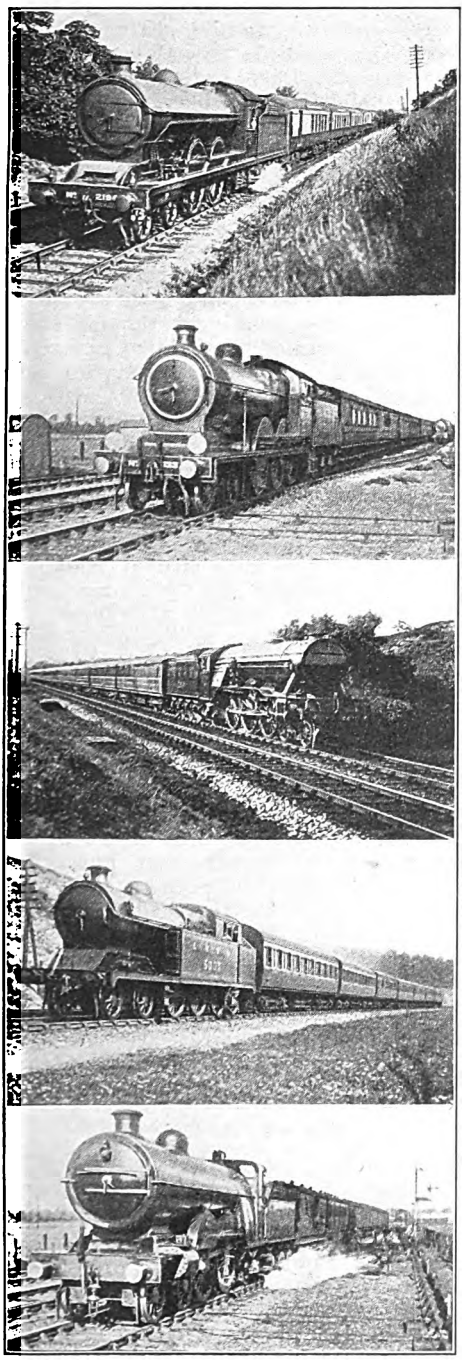
the Central station, Sydney's principal terminal, to St. James's station, near the centre of the city. Many thousands of people made the journey on the first day.



SECTIONAL VIEWS OF L.N.E.R. TRAINS.

WE reproduce on this page five views of L.N.E.R. trains by arrangement with *The London & North Eastern Railway Magazine.* They are the work of Mr. H. G. W. Household, who is at present stationed at King George Dock, Hull. They are as follows:—

1. Down "Harrogate Pullman." North Eastern 3-cylinder Class Z locomotive No. 2196.
2. Norwich to Liverpool Street Express. Great Eastern 4-6-0 locomotive No. 8533.
3. Up mid-day "Flying Scotsman." L.N.E. 3-cylinder "Pacific" type locomotive No. 2571.
4. Marylebone to Aylesbury suburban train. Great Central 4-6-2 tank locomotive No. 5007.
5. 11.2 a.m. Cambridge to King's Cross. Great Northern "Atlantic" type locomotive No. 1441.

* * *

L.N.E.R. PACIFIC locomotive No. 2553, previously named *Manna*, in the racehorse series, has been renamed *Prince of Wales* in honour of the fact that it was inspected by His Royal Highness on the occasion of his recent visit to Doncaster works.

* * *

THE New Zealand Minister of Public Works opened, on December 20, a further section of the new main trunk line in the Taranki district. The section includes four tunnels, one about a mile in length, and 14 bridges.

* * *

SIR MALCOLM HAILEY, Governor of the Punjab, on Tuesday, December 21, formally opened for traffic a new feeder line from Lahore to Narowal, thus connecting Sialkot with the capital of the Province.

* * *

THE four lifts at Highgate station, London Electric Railway, are to be superseded by comb-type escalators. Work will begin shortly, and it is hoped that the improvements will be complete by next summer. The scheme provides for twin escalators in one shaft extending from a site near to the lifts, to the platform level, thus carrying the passengers direct to the trains and obviating the necessity for negotiating subways as at present. When the escalators are installed, the lifts will be dismantled and the space they occupy devoted to the formation of a larger passimeter booking hall.

* * *

WE are informed that on the occasion of the inauguration of electric traction between Paris and Vierzon, Paris-Orleans Railway, on December 22, as reported in our last issue, the inaugural train, drawn by electric locomotive No. E.502, covered the distance of 127 miles between the two places mentioned in 1 hour 57 minutes, representing an average speed of about 65 m.p.h. The maximum speed recorded was about 78 m.p.h., this applying over considerable periods. This is believed to be the highest average

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speed recorded for a corresponding distance, in view of the fact that the load was, we understand, in the neighbourhood of 380 tons.

* * *

THE Minister of Transport has recently made the following order: The Dudley and District Light Railways Extensions (Amendment) Order, 1926, authorising the abandonment of parts of the light railways authorised by the Dudley and District Light Railways Order, 1898, and the Dudley and District Light Railways (Extensions) Order, 1900.

* * *

WATER troughs are being laid in at Floriston, near Gretna, and at Carstairs and New Cumnock, on the Caledonian and Glasgow and South-Western sections of the L.M.S.R. It will thus become practicable to avoid stops for watering purposes on the Scottish sections, as in the case of routes south of Carlisle. It will also be practicable to lengthen non-stop journeys, if found desirable, while, if need be, engines can work through between the routes north and south of Carlisle. The new facilities will also enable stops at places such as Dumfries, Kilmarnock, Carstairs, and other places to be eliminated unless required for traffic purposes.

* * *

SLOANE SQUARE station, Metropolitan District Railway, is to be the first station on that line to be equipped with an escalator for its own traffic. All other District stations which have escalators connect with deep level tubes. The new escalator is to be an ascending one from the westbound platform to the street level, with an intermediate landing for eastbound passengers. Its construction forms part of a general scheme of reconstruction. The other improvements include the complete rebuilding of the booking hall and entrance to the station, and the installation of two booking booths. The new station will resemble closely the new Morden line stations and will include a scheme of flood lighting to render it conspicuous at night time.

* * *

THREE new coloured picture posters issued by the Southern Railway Company include a large view of Ramsgate, by Aubrey Hammond, which cannot fail to attract much popular attention. The two smaller bills show (1) a pleasing view of the Thames at Richmond, here styled "The Garden of London," by V. L. Danvers; and (2) a particularly bright and tastefully designed announcement relating to Christmas excursions to the "Sunny South and West," by Herbert Gandy.

AT the principal station of the New South Wales Government Railways at Sydney 170,000 passengers are handled every weekday, while, in addition, something like 15,000 parcels are dealt with at the Central station on each working day. For the 12 months ending June 30, 1926, 4,734,591 parcels were handled, these all being consignments not exceeding 3 cwt. Apart from this large traffic, something like 1,758,192 packages of newspapers left Sydney station during the year for the suburbs or the country, these being conveyed at a quarter the ordinary rate, the resultant revenue amounting to £38,657.

* * *

THE Wimbledon and District Model Railway Club send a copy of their calendar for 1927. This is a neat though simple production, adorned by a print of an interesting view of a corner of a goods yard on a model railway.

* * *

WRITING from Northam, Mr. H. J. Bromilow, District Engineer, Western Australian Government Railways, refers to the particulars given recently with regard to 13 of the longest station platforms, and points out that the goldfields city of Kalgoorlie, in Western Australia, has a platform 1,065 ft. long, excluding two 25-ft. ramps. The length of this platform is occasioned by the fact that on the east the trans-Australian trains from Port Augusta are berthed, while beyond the station buildings the Western Australian trains for Perth are accommodated. This platform is, however, much shorter than most of those previously mentioned.

* * *

TO meet the demands of tourist and commercial traffic between Great Britain and Austria, the Austrian Federal Railways have established in London an Official Agency at 25, Cockspur Street, under the managership of Mr. S. F. Mayer.

* * *

THE Southern Railway has introduced weekly season tickets at specially low rates between certain stations in the Plymouth area.

* * *

THE annual general meeting of the Stephenson Society was held on Saturday, December 11, and was followed by the annual dinner at the Holborn Restaurant. Mr. L. E. Brailsford, one of the original members, pointed out, in the course of his speech, that the date was the actual birthday of the society, it having been formed on December 11, 1909, and he was pleased to see that the membership was well on its way to completing the second century.

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REVISED railway charges for Freight Traffic become applicable on February 1, bringing the basis substantially to 60 per cent. above the pre-war level (50 per cent. in the case of agricultural manure and traffics for blast furnaces and steel works). This step has been rendered necessary by the situation in which the companies have been placed as a result of the general and coal strikes. Generally speaking, the result is equivalent to the situation which will apply when the new Schedules of Standard Charges settled by the Railway Rates Tribunal come into force on "the appointed day" (yet to be announced), except that the latter, carrying out certain provisions of the Railways Act, 1921, cover also re-classification and other charges, affecting passenger as well as freight traffic.

* * *

IN the New Year Honours, Mr. John Henry Follows, C.B.E., Vice-President for Railway Traffic Operating and Commercial Sections, London Midland and Scottish Railway, received the honour of M.V.O. (4th class).

* * *

THE Directors of the London Midland and Scottish Railway have made the following further appointment taking effect from January 1:—Mr. E. D. Grasett, Traffic Superintendent, former North Staffordshire Railway, and acting as temporary Assistant to Chief General Superintendent, Derby, to be Divisional Superintendent, Derby, vice Mr. S. B. Carter.

* * *

FOLLOWING the retirement of Captain Richard Sharp, the Marine Department of the Great Western Railway has been combined with the Docks Department under the control of the Chief Docks Manager, Mr. C. S. Page, Cardiff. Mr. W. J. Thomas has been appointed Chief Marine Assistant to the Chief Docks Manager.

* * *

MR. G. B. HOWDEN, District Engineer for the Southern District of the Scottish Area, L.N.E.R., has been appointed to succeed the late Mr. T. D. Morton as District Engineer, Head Office, Edinburgh. Mr. R. C. Rattray, Assistant District Engineer, Guide Bridge, has been appointed to succeed Mr. Howden.

* * *

WE regret to record the death, on January 11, in his 70th year, of Mr. David Campbell Rattray, formerly Chief Engineer of the Lancashire and Yorkshire Railway.

AT the Scottish headquarters in Glasgow of the L.M.S.R., on January 6, Mr. Donald A. Matheson, who retired at the end of last year from the position of Deputy General Manager for Scotland, was the recipient of presentations from his late colleagues. Mr. R. Killin, C.B.E., General Superintendent, Northern Division, presided. Mr. D. McLellan, Divisional Engineer, Glasgow, made the presentations, which included a silver Georgian salver and coffee service.

* * *

WIMBLEDON MODEL RAILWAY CLUB.—arrangements include:—February 7, 7.45 p.m., lantern lecture on "Railway Signalling" by Mr. A. V. Hichisson (Westinghouse Brake & Saxby Signal Company). February 21, 7.30 p.m., Test Track Night and Monthly Competitions. Both meetings at the Red Cross Hall, Church Road, Wimbledon. The club is participating in the "Week of Youth" to be held in Wimbledon, March 22 to 29 next.

* * *

THE Annual General Meeting of the Transport, Observation and Models Society was held at St. Brides Institute on Saturday, December 18, there being a good attendance. Mr. E. E. Watson was re-elected Chairman for 1927, and Mr. G. S. Moore's vacated position on the Committee was taken by Mr. C. B. Maycock. The Hon. Sec. is Mr. S. M. W. Hann, Frensham, Shirley Road, Croydon.

* * *

JOSEPH KAYE & SONS LTD., Lock Works Leeds, send a copy of their new illustrated catalogue of oil feeders, petrol funnels, oil cabinets, &c. A wide variety of appliances of the kind indicated is illustrated, with particulars and prices. The firm will be pleased to send a copy of this catalogue to any reader on receipt of a postcard.

* * *

THE Minister of Transport has recently made the following Order: The Kingsnorth Light Railway Order, 1926, authorising the reconstruction and working for passenger traffic as a light railway of an existing railway in the Parish of Hoo St. Werburgh, in the County of Kent.

* * *

BY a transposition of numerals, the number of the locomotive shown in the illustration on page 473 of the December issue was given as 8509, instead of 5908.

* * *

A READER asks for information as to the present whereabouts of L.M.S.R. (L.N.W. section) locomotive No. 639, *Ajax*.

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(29) shed plates. Midland 0-6-0's Nos. 3189, 3237, 3358, 3389, 3502, at Carnforth, carry L.N.W. (36) shed-plates, in addition to Midland (31) plates, and work regularly between Carnforth, Barrow, and Whitehaven. Class "4" 0-6-0's Nos. 3993 and 4394 have been observed on empty wagon trains from Carnforth to Barrow. Regarding the mention of a M. and C.R. 4-4-0 bearing the No. 10100 in the Locomotive Matters section of the October issue, this number is carried by an L. and Y. class "2" 4-4-0, and there were no 4-4-0's in the M. and C.R.'s list at the time of the grouping. It is suggested that the engine may have been Furness section 4-4-0 No. 10188, which has worked excursions from Barrow to Blackpool and Southport on several occasions.—["FURNESSIAN."]

L N.E.R.

Several G.E. section 4-4-0's have been working on the Cheshire Lines recently. These include No. 8808 noted on a C.L.C. Chester–Manchester Central train and occasionally working Manchester Central–Liverpool expresses, and No. 8823, seen on an Irlam–Manchester Central slow train.—[R. DYSON.]

G.C. 4-4-0 No. 5113, which has worked the Harwich-Liverpool and return express as between Lincoln and Sheffield regularly from July, 1925, to September 19, 1926, has now been replaced by G.N. 4-4-0 No. 4369. N.E. locomotives now stationed at Lincoln include 0-8-0's Nos. 901, 905, and 2237, and class "S" 4-6-0's Nos. 727, 780, and 2115. Until the General Strike several trains were worked from Chesterfield to Lincoln by engines of the old L.D. & E.C.R., now G.C. section L.N.E.R., but none have been noted on these duties lately and the turns are now worked by G.C. 4-4-2T's Nos. 6123, 6126, and 6136, also 0-6-0 large-boilered goods engines.—[G. EVERETT.]

G.N. "K.2" 2-6-0's No. 4644, 4652, 4653, and 4656 are at Stratford, G.E. section. It is probable that all the remaining 2-4-2T's of the G.E. 7650-7679 batch will be broken up shortly. Doncaster is now building some "N.7" 0-6-2T's with Belpaire fireboxes, of which 19 are intended for service in Scotland.—[J. R. WEDGE.]

G.C. locomotives noted at Cambridge include 0-6-0's Nos. 5797, 5811 and 5815.—[R. F. LANCHESTER.]

N.B. section 4-4-0 No. 10361 is now at Cowlairs Works with two other 4-4-0's from the same section, for breaking up.—[J. F. McFWAN.]

G.W.R.

The building of the larger express engines has released a number of "Bulldog" and "Flower" class 4-4-0's for service at some of the smaller sheds. Leamington district now has "Flower" class 4-4-0's, Nos. 4104 *Cambria*, 4112 *Oxford*, 4149 *Auricula*, and 4158 *Petunia*; "Duke" class 4-4-0's Nos. 3257 *King Arthur*, 3260 *Mount Edgecumbe*, 3266 *Amyas*, 3268 *Chough*, 3272 *Fowey*, 3274 *Newquay*, 3278 *Trefusis*, 3281 *Cotswold*, 3283 *Comet*, and 3285 *Katerfelto*. Locomotives of the 4-6-0 type are rarely seen on the Chester–Birkenhead line. All Paddington expresses change engines at Chester, and the journey farther north is frequently made behind 2-6-0's and 0-6-0's.—[W. S. DAVIS.]

Outside-framed 0-6-0 No. 22 has been working in the London district, and recently worked the 8.33 a.m. Southall to Paddington train, usually worked by tender engines of the 0-6-0 and 2-6-0 types relieved at times by 4-4-0 "Bulldogs" or other classes. Presumably, No. 22 is the lowest number seen in the London district since the renumbering of "Brunel" and "Charles Saunders," now at the end of the Badminton (4100) series. —[P. E. NEWSON.]

S R.

2-6-0 No. 871A was observed on an up main-line goods at Tonbridge. 0-6-0T No. 10A has returned to Canterbury shed from Ashford shops, and with Nos. 147A (domed) and 77A (domeless) is working the Whitstable line.—[F. A. G.]

"King Arthur" class locos. work several of the London–Weymouth expresses over the Bournemouth-Weymouth section, engines being changed at Bournemouth. No. 736E *Excalibur* has been temporarily stationed at Bournemouth.—[C. H. MOOR.]

0-6-0 locomotive No. 083E is now stationed at Dorchester, painted and lined in S.R. standard colours for goods locomotives, and is employed on goods and coal trains between Dorchester and Portland.—[C. R. T.]

IRISH RAILWAYS.

G.S. & W. 4-4-0 No. 531 is running on the D.S.E. section, from Grand Canal Street shed, Dublin. 4-4-2T No. 270 is also stationed there, and 4-4-2T No. 274 has now returned after repair. Further G.S.R. locomotive re-numbering includes the following (old numbers and names follow in brackets): 2-4-0T No. 423 (D.S.E. No. 49), 4-4-0 No. 450 (D.S.E. No. 55), 4-4-2T No. 460 (D.S.E. No. 53), 4-6-0T No. 471 (C.B. & S.C. No. 10), 0-6-2T No. 490 (C.M.D.R. No. 5), 4-4-0 No. 534 (M.G.W. No. 2, *Jupiter*), 4-4-0 No. 542 (M.G.W. No. 9, *Kylemore*), 4-4-0 No. 547 (M.G.W. No. 125, *Britannia*), 0-6-0T No. 551 (M.G.W. No. 106, *Lark*), 0-6-0T No. 553 (M.G.W. No. 108, *Swallow*), 0-6-0 No. 603

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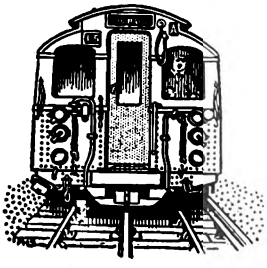
(M.G.W. No. 65, *Wolf*), 0-6-0T No. 615 (M.G.W. No. 101, *Grant*), 0-6-0 No. 635 (M.G.W. No. 41), 0-6-0 No. 636 (M.G.W. No. 36), 0-6-0 No. 644 (M.G.W. No. 47), and 2-4-0 No. 656 (M.G.W. No. 30, *Active*).—[K. A. MURRAY.]

Several of Mr. Glover's G.N. of I. large "D" class 0-6-0 locomotives, are stationed at Dundalk Junction, for working north-bound main-line freight trains unassisted. Formerly these heavy trains were "banked" to Adavoyle, over the Wellington bank (through the famous "Gap of the North"). Class "D," No. 2, has been noted working freight trains recently between Adelaide and Clones and *vice versa*, in turn with the Class "C" locomotives. Old Class "E" 0-6-0 mixed traffic locomotive No. 137 is shunting at Clones, and No. 37 of the same class is working the Inniskeen–Carrickmacross branch. 2-4-2T No. 90 is working the Cootehill branch. The "up mail," Londonderry to Dundalk via Enniskillen, is being worked by 5 ft. 9 in. 4-4-0 superheaters, Nos. 198 and 200, on alternate weeks (ex Omagh). The G.N. own five locomotives of this class, Nos. 196–200 inclusive, specially designed by Mr. Glover, for the heavy grades on the Dundalk–Omagh (via Enniskillen) section; perhaps the heaviest grades are Clones to Newbliss, 4 miles of up grade, the Thomastown "bank" at Dundalk, and the Shantonagh "bank" at Ballybay. The "196" class, however, can negotiate these grades with ease. G.S. & W. (ex W. & L.) 4-4-2T No. 274 has been returned to the D. & S.E. section (Canal Street), together with G.S. & W. bunker 0-4-4T No. 75. D. & S.E. small wheeled 2-4-2T No. 427 (64) is now in traffic, after light repairs at Canal Street. D. & S. E. 0-6-0 freight locomotive No. 4 is now in traffic.—[J. J. KENNEDY.]

G.N.R. (I) No. 156, formerly a non-superheated 4–4–0, 113 class, has been superheated and fitted with piston valves, and is stationed at Dublin, for working some of the Belfast expresses. Apparently, the rebuilt and superheated engines of the 131 class can now work from Dundalk to Enniskillen, as No. 130 was attached to the 4.23 p.m. ex Dundalk recently D.S.E. 2-4-2T., No. 8, has been returned to the D.S.E. section and re-numbered 434.—["TELESCOPE."]

D.S.E. No. 47 (now 425); 64 (now 427); No. 9 (now 424); and No. 14 (now 443) have been overhauled and returned to the D.S.E. section. 4–4–0 No. 87 works the 7.0 a.m. Wexford up and 10.30 a.m. Bray down trains. Many of the engines sent to this section at first have been withdrawn since September 15. The following have been seen on the section:—D.S.E. engines, Nos. 4, 7, 15, 16, 20, 28, 29, 30, 34, 35, 58, and 67, also Nos. 424, 425, 427, 431, and 443. M.G.W.R.'s 2–4–0 No. 34, *Aurora* and 0–6–0 No. 74, *Luna*. G.S.W.R. 0–6–0's 122, 128, 134, 148, 149, 150, 165, 183, 198, and 256; 0–4–4T. No. 72; 4–4–2T. 274 (ex-Waterford, Limerick and Western Railway's No. 21, *Blarney Castle*, rebuilt in 1924, but retains Kitson's plate on bunker); 4–4–0's Nos. 56, 60, 63 (these are engaged on Harcourt St. line), 87 and 89. At the beginning of September 0–6–0 No. 172 was engaged on Shillelagh branch and 4–4–0 No. 56 and 0–6–0 No. 150 (both G.S.W.) were on the Waterford–Macmine branch. No. 296 (ex-W.L.W.'s 4-4-0 No. 53, *Jubilee*, with Kitson's plate retained) and No. 81, 0–4–0T., were seen in Wexford. M.G.W. 0–6–0's *Ajax* and *Bittern* were reported at Enniscorthy recently.—[HIBERNIA.]



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PART OF WEST CROYDON STATION.

Wimbledon Line Rail Motor in Bay Road. L.B.S.C. Section 0-4-2 Tank Locomotive No. 627.

The West Croydon and Wimbledon Railway.

BY J. G. B. SAMS.

(*Photographs by J. F. Gairns.*)

THE West Croydon and Wimbledon Branch of the London, Brighton and South Coast Railway was opened as a "single" line throughout in 1855, largely through the instrumentality of Mr. G. P. Bidder, of Mitcham, who, according to local tradition, was of humble parentage, but also of vast mathematical ability, and used in his early youth to tour the country attending Fairs and the like as the "Calculating Boy," answering at sight all sorts of stiff arithmetical questions. This unusual ability so struck an onlooking gentleman, that he decided to educate young Bidder, who afterwards rose to considerable fame and affluence as an engineer, and in the good old days of named engines on the L.B. & S.C. Railway, was commemorated by engine No. 204 "G. P. Bidder," one of a group of Mr. R. J. Billinton's earliest 4-4-0's, which, I think, were all named after celebrated engineers. This gentleman's son, who bore the same name, was a Q.C., and is commemorated by a monument placed in the middle of Mitcham Common alongside the Croydon Road on account of his successful efforts to preserve Mitcham Common for the public use.

The section between Mitcham and Mitcham Junction stations was doubled in March, 1879; and the working to-day over the remaining sections is controlled by the electric-train staff.

This branch connects towns of very great historic interest, beside passing through the nearest real country to Charing Cross, and it is also extremely interesting to railway students in that, from a point opposite Mitcham Parish Church to the beginning of the curve, just by the Croydon and Sutton Branch, it runs over the track of the Surrey Iron Tramway which was opened in 1804.

I am indebted to the Editor of the *Southern Railway Magazine*, and to the Chairman of the Mitcham Urban District Council for the following particulars of this interesting old tramway, which cost £60,000 to construct. The gauge was

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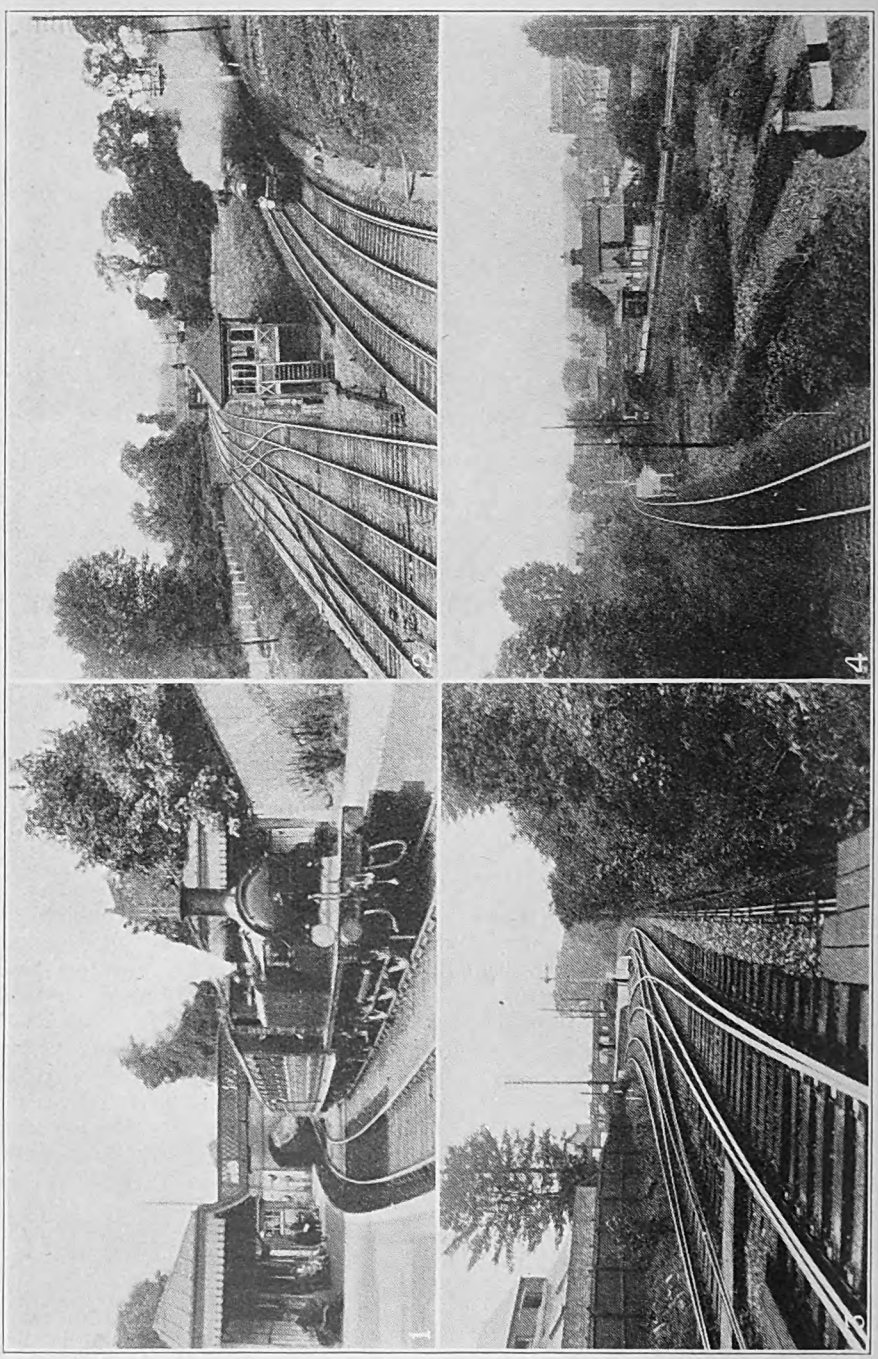

1. MITCHAM STATION, WIMBLEDON AND CROYDON MOTOR TRAIN AT PLATFORM. 2. MITCHAM JUNCTION, EXPRESS FROM LONDON TO SOUTH COAST ON MAIN LINE CURVE LEADING TO STATION, WIMBLEDON LINES ON LEFT. 3. MERTON PARK STATION FROM WIMBLEDON END. 4. MERTON PARK STATION FROM MORDEN END.

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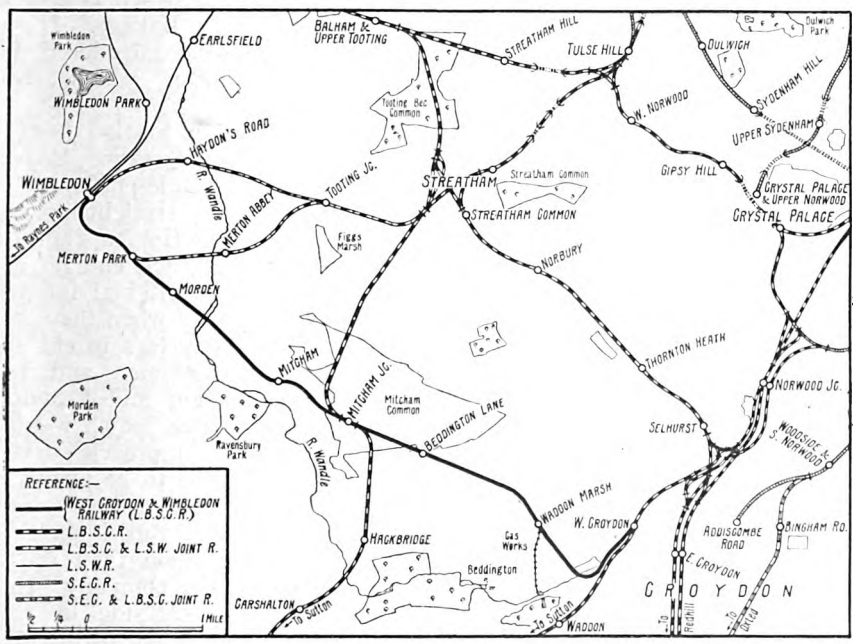
4 ft. 6 in., and the rails were cast iron of L-section, laid on stone blocks. It was sanctioned by an Act of Parliament in 1801, and would thus probably be the earliest tramway for the conveyance of public goods. The "main line" went from the banks of the Thames at Wandsworth to what is now Lower Church Street, Croydon, hard by the Parish Church, where it joined up with the Croydon, Godstone and Merstham Iron Railway. A branch ran from a point just about at the first overbridge north of the Mitcham Junction Station on the Wimbledon Branch to Hackbridge. The tramway is commemorated in Mitcham by

Wandsworth and Godstone. In connection with these historical old tramways it is recorded that a bet was made locally that a horse would start from rest and draw 36 tons for six miles, the test load actually consisting of twelve wagons of stone weighing three tons each, and the horse being a casually-chosen farm horse. The bet was won easily, and final experiments showed that the same horse could start from rest and pull with ease sixteen of these loaded wagons with fifty men "up" in addition, the total weight hauled being 56 tons.

To return to the existing railway, which starts from its own dock at the



the names "Tramway Path" (a path parallel to the Wimbledon Branch), and "Tramway Cottages," which were built on the actual site of the Hackbridge Branch, and are those old and new cottages immediately to the left of Mitcham Junction Station. Church Street, which was laid over the site of the main line, is still locally known as the "Iron Road." Unfortunately, the Surrey Iron Tramway did not prosper, and finally passed into the hands of a Receiver, who wound it up in 1846.

The Croydon, Godstone and Merstham Iron Railway was no doubt of the same gauge, &c., so that it is conceivable that through goods trains were run between

south-west end of West Croydon up platform, and then runs parallel to the Sutton branch for about half a mile, until it turns off sharply to the north-west over Waddon Marsh. The signal-box and train staff station of this name is 1 mile 17 chains from West Croydon, and controls a group of private sidings (this being the industrial end of Croydon), including the large yard of the Croydon gasworks, where sometimes one can see a most extraordinary shunting engine looking like a cross between an electric engine, a traction engine, and an ordinary four-wheeled railway shunting engine. Just short of Beddington Lane

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station (2 m. 32 ch.) is a ground-frame controlling a large cement works siding and the local depot of the railway company's permanent way department.

The Croydon and Wimbledon Railway Act of 1853 gave authority for the railway company to cross on the level highways at seven places and to erect and maintain a station or lodge at such crossings. Beddington Lane was referred to in the Act as "No. 1 Crossing." The station was originally called "Beddington," but was changed in 1887 on account of a memorial from the inhabitants of Beddington, which lies about two miles away. To rectify things Waddon station on the West Croydon and Sutton branch was renamed "Waddon for Beddington and Bandon Hill," and everybody was then satisfied.

Beddington is an historical old place, and very well worth a visit, the best way being to take train to Beddington Lane and then walk through Beddington (turning to the right just over the River Wandle) and Beddington Corner (past a row of wooden cottages also on the site of the S.I.T.) back to Mitcham Junction, about four miles in all. It is possessed of a beautiful old church containing some sculptured monuments to the Carew family, and an ancient leaden coffin with carved scallop shells on its top belonging to the Roman-British period which was found during some excavations just outside the church, which dates back to the fourteenth century. Next door to the church is a large manor house, formerly the seat of the Carew family, but now a girls' orphanage; the Great Hall here should certainly be inspected. One passes by also what is said to be the previous manor house to the above, a large and beautiful old house of the early fifteenth century.

Beddington is additionally famous for its connection with Sir Walter Raleigh, who married one of the Carews, and was buried here immediately after his execution by James I. The following letter from Lady Raleigh to her brother, Sir Nicholas Carew, was written on the day that Sir Walter was beheaded, October 29, 1618:—

"To my best brother, Sir Nicholas Carew, at Beddington.—I desire, good Brother, that you will be pleased to let me bury the worthy body of my noble husband, Sir Walter Raleigh, in your Church at Beddington—where I desire to be buried. The Lords have given me his dead body, though they denied me his life. This night he shall be brought to you with two or three of my men. Let me hear presently.—E. R."

In the mansion grounds next to the church are the extensive ruins of an Orangery built by Raleigh's brother-in-law where the first oranges in England were grown from seed supplied by Sir Walter. In this very garden also were grown the first crop of potatoes in this country, and report has it that Raleigh built the snuff-mill which is now a part of Messrs. Wallis's Bakery. It will be remembered that he introduced tobacco into England, from which snuff is made.

Mitcham Junction Station (3 m. 9 ch.) is the first "crossing" station, Beddington Lane being only a single-platform "Halt." The Branch lies in a straight line through the Station while the Horsham and London line approaches at each end on a sharp curve. It was the original intention of the railway company when they planned the line in the early 60's to cut straight across Mitcham Common and to pass over the Wimbledon and Croydon line at about right angles, which would have avoided the above approach curve; the station was intended to be placed at the overbridge which marks the beginning of the Common about three-quarters of a mile nearer to London than the actual site. Possibly the company still owns the ground on each side of the line at this overbridge, but owing to local opposition, the Horsham line was carried round the common and the station built at the intersection of the two lines, instead of the far more convenient site nearer London.

The Wimbledon Branch, to return to it, is now "double" to Mitcham Station (3 m. 66 ch.) where there is a large goods yard (the only one on the branch) for supplying the wants of the growing population hereabouts. The field just to the south of the station is known as "Dead Man's Field" and is a part of a Saxon Burial-ground; in fact the whole area from here to the parish church was a vast burial-ground in which diggers for

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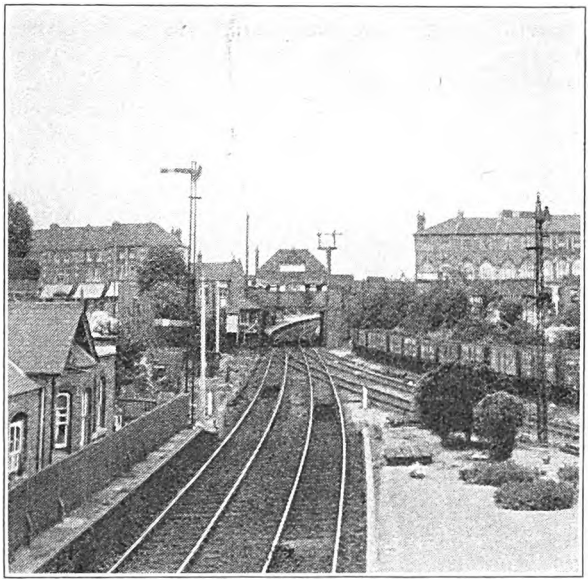
allast have found many Saxon keletons, implements, arms, ins, &c.

Mitcham is famous, or rather famous, on account of its allast and the vast quantities all sorts of rubbish from all er London that are dumped to the worked out pits to fill . Recently the dumpings con-sted chiefly of the "spoil," nsisting mainly of unobjec-nable London clay, from the ty and South London extension Morden.

Morden Halt (5 m. 2 ch.) was e only station serving a large d truly rural area in which uch pleasant walking is to be und, but this is being changed, the C. & S. L. Tube extension, well as the proposed Wimbledon Sutton Railway, intersect this ea and will certainly bring about uch house-building. At present is the most rural and untouched ighbourhood of any within the same dius from Charing Cross.



TOOTING JUNCTION.

At Merton Park (5 m. 38 ch.) our branch ins up with the southern loop of the ooting and Wimbledon Branch of the -L.B. & S.C. Railway (opened in 1868) d from this point to Wimbledon the line double. Merton in the past was of eat ecclesiastical, which then meant litical, importance. The previous station Merton Park on the Tooting Junction ie (Merton Abbey) is situated on the act site of the great Church of Merton bey, and quite recently further dis-veries of the foundations in and about e station have been made, showing that must have been of cathedral-like oportions.

The reason why there is absolutely thing left above ground of this important bey is that Henry VIII pulled it down to se the stones and other material for ie building of his new enormous palace Nonsuch, a large park near Cheam; and ious people may well think of the "curse f the Church" when they are told that ot a single foundation or even stone is ft of this vast palace. According to cal history a large part of early Epsom as built out of materials taken from Nonsuch when it was dismantled. The name "Nonsuch," which was invented to suit the style of the palace, is said by historians to have been copied from the name of one of King Sennacherib's palaces at Nineveh.

Merton (which gives its name to Merton College, Oxford) was at one time the seat of Nelson, whose hatchment is to be seen in the Parish Church. The Hamilton family, to whom he was so attached, lived here, which fact no doubt induced him to do likewise.

Wimbledon (6 m. 16 ch.), the end of the Branch, was the birthplace of the modern "volunteer" movement (the forerunner of the Territorial Army of to-day). A meeting was held in 1797 and two corps were formed, the very first Royal Volunteer Review being held on the Common a year afterwards. On the Common is to be found a circular earthwork generally attributed to Julius Cæsar when he was fighting with Cassivelaunus in these parts.

The Branch passenger service is operated by "motor" trains, consisting of a 0–4–2 Stroudley tank engine and two coaches, and is made up of 14 trips from Wimbledon to West Croydon (one being extended to the Crystal Palace), two trips from Wimbledon to Sutton, one trip from Wimbledon to Mitcham and one trip from

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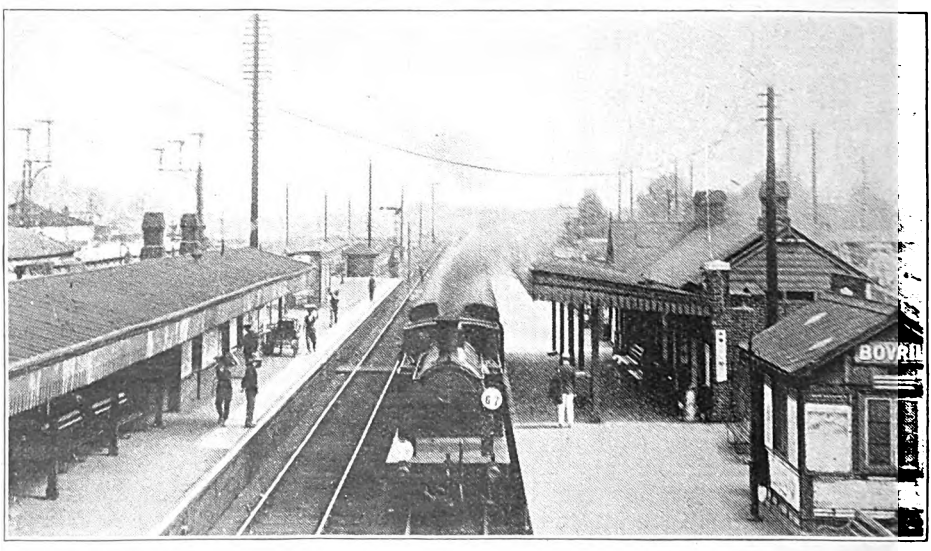
Mitcham to West Croydon and the Crystal Palace. In the reverse or "down" direction, the services are the same except there is one more trip from Croydon and one less from Sutton. All the Croydon trains start directly from West Croydon. What is really required to enhance the value of this little railway is a "spur" line from West to East Croydon stations, to enable the rapidly-growing population about the Branch easy access to the Brighton and Eastbourne main line at East Croydon; at present it is very awkward for these people as they must either go up to London or make their own way from one station to the other through narrow and crowded streets.

Before the days of "motor" or "pull-and-push" trains, as they are usually called, the Branch services were run by Stroudley 0–6–0 tanks of the "Terrier" or "Rooter" class (the latter was the usual railwayman's name for them) the last survivals being 61 "Sutton" and 62 "Martello" to the best of my recollection. The "train" consisted of half a dozen four-wheeled coaches of the Stroudley suburban pattern with "open" thirds.

The goods service is a very important one and is based chiefly on Norwood sidings although a couple of trains start from New Cross. The first train is the 2.50 a.m. ex New Cross booked to work all the Croydon and Wimbledon Branch yards and sidings and to go on to Tooting Junction via the southern loop. The return trip is booked to start at 8.25 a.m. and returns the same way. Next is the 8.30 a.m. from Norwood sidings which is booked to convey traffic for private sidings at Waddon Marsh and Beddington Lane, returning at 3.10 p.m. The 5.10 a.m. trip New Cross to Waddon Marsh follows the above trip from Norwood and conveys coal for the Croydon Gas Company's sidings at Waddon Marsh returning with the empties at 11.25 a.m. The 12.55 noon from Norwood sidings to Mitcham is used to clear up this large yard and returns at 6.5 p.m. The last regular trip is the 2.37 p.m. Norwood sidings to Haydon's Road (the next station to Wimbledon on the northern loop to Tooting Junction) and 5.10 p.m. return. There is also a "conditional" trip at 4 p.m. from Norwood sidings to Waddon Marsh to clear up any coal traffic left over for the Gas Company's sidings.



EAST SIDE OF WIMBLEDON STATION, LOOKING NORTH.

West Croydon and Wimbledon Loop Trains use these Platforms.

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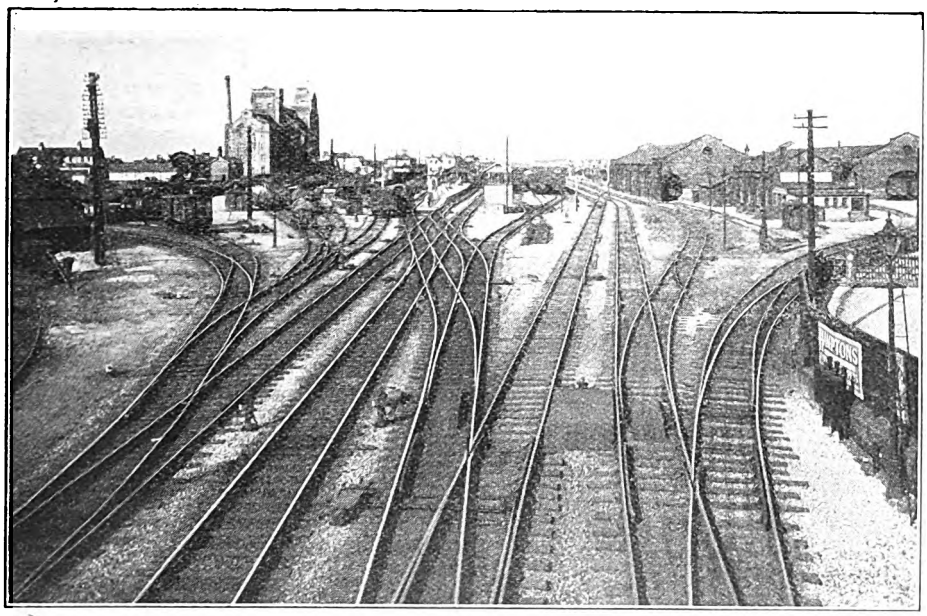

APPROACH LINES FROM THE SOUTH.

Power Signalling at Cambridge, L.N.E.R.

THE sixth annual meeting of the Institution of Railway Signal Engineers was held in London last October and proved a most successful gathering, a record number attending the annual dinner, held in the Wharncliffe Rooms at the Hotel Great Central, Marylebone Station, L.N.E.R., on the Thursday, Mr. F. Downes (Telegraph Superintendent, Southern Area, L.N.E.R.), President for the year, presiding, and large numbers visiting the places where new installations of telegraph and signalling apparatus were inspected.

At 11.30 a.m. the next day the members left for Cambridge, special coaches being provided, together with luncheon (served en route), by the courtesy of the London and North Eastern Railway Company. On arrival at Cambridge the members were formed into parties and immediately commenced an inspection of the new all-electric dynamic-indication power signalling installation which was brought into use between June 20 and September 19 last year. This installation comprises two signal cabins which displaced five mechanical signal cabins. The north cabin has 72 levers and the south cabin 128 levers, while in conjunction with them are 48 track circuits having a total length of four miles.

The system of signalling adopted is based on the British Power Railway Signal Company's system of dynamic indication applied to effect automatic indication movement of the signal and switch levers, together with an efficient cross-protection apparatus to prevent any unauthorised movements of signal or switch. Power is D.C. 110 volts from accumulator batteries. The running signals have their operating circuit taken through the respective track circuit, switch detection and slotting relay controls.

The signal lever when placed to normal allows the signal to go to "danger" by gravity and reverses the directional movement of the motor. The over-run of the motor after the signal has reached its "danger" position develops an indication current which gives an automatic indication stroke to the lever. The dwarf signals are of the solenoid type, and for these, battery indication is arranged to effect a similar automatic indication stroke to the lever.

One switch lever is required for either

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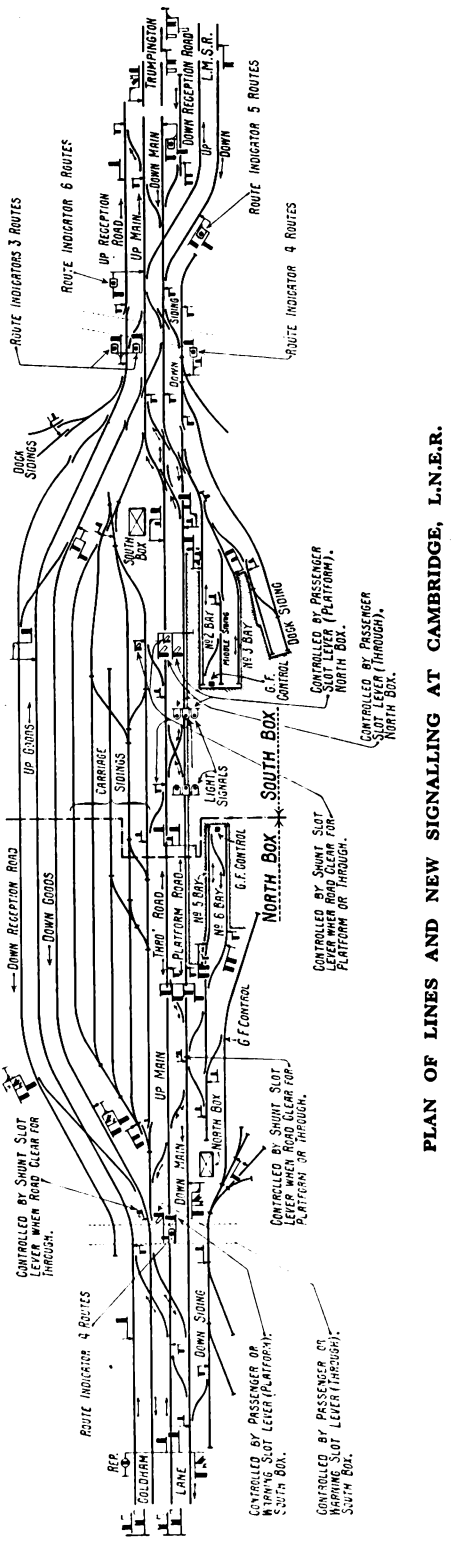
single or double-end switches. Cross-protection is retained, and dynamic indication, giving automatic indication movement of the lever, is arranged for normal or reverse position of the switch or switches. Route light indicators of the B.P. type are installed, these working in conjunction with the top arm. The circuit for a letter or figure for the desired route is set up through a route relay with multiple contacts, and displayed only when the top arm is in the "clear" position. The track circuits are independently fed from the cabin supply, all relays being housed in a cabinet in the lower part of the cabin. "Dolls-eye" type track diagrams are installed at each cabin.

The general arrangement of the signalling is particularly interesting, as a type of station lay-out has been dealt with where one common platform road only is used for both up and down main-line traffic. This platform road is provided midway with scissors crossing connections to the through road, thus forming a double loop, signalled for up and down traffic on each line, these crossings being under the control of the South cabin.

In consequence of this arrangement of tracks, the slotting arrangements and controls between cabins are somewhat complicated in order to meet the peculiar requirements of "clear road" or "warning and shunt" movements at this place. Two slot levers for each of the platforms and through roads in each direction of traffic are provided in each cabin, viz.: "Clear road slot lever" and "warning and shunt slot lever." The "clear road" slot levers are controlled by the tracks and lock up the road beyond the next signal and allow for a train to proceed at maximum speed allowable at this place. The "warning slot" levers (on the up inner homes to platform, or through) are free of tracks and locking beyond the next signal and when pulled do not "clear" the signal until a train has been brought to or nearly to a standstill on a short length of track circuit approaching the slotted home signal. The "shunt slot lever" (which is also the "warning slot lever") is pulled only when the track is unoccupied up to the next signal, but the slotted shunt signal is free of the shunt slot when the road is occupied.

In connection with the South cabin



PLAN OF LINES AND NEW SIGNALLING AT CAMBRIDGE, L.N.E.R.

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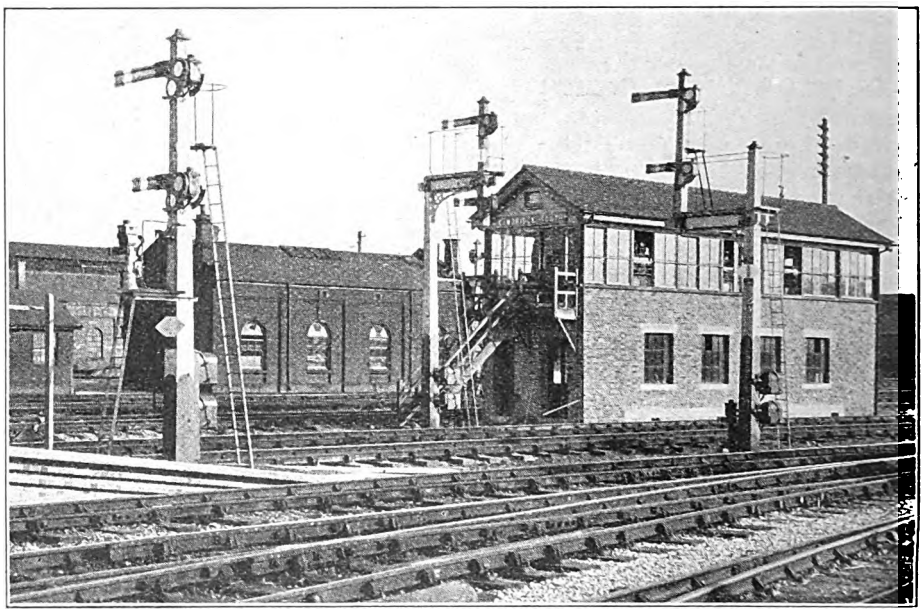
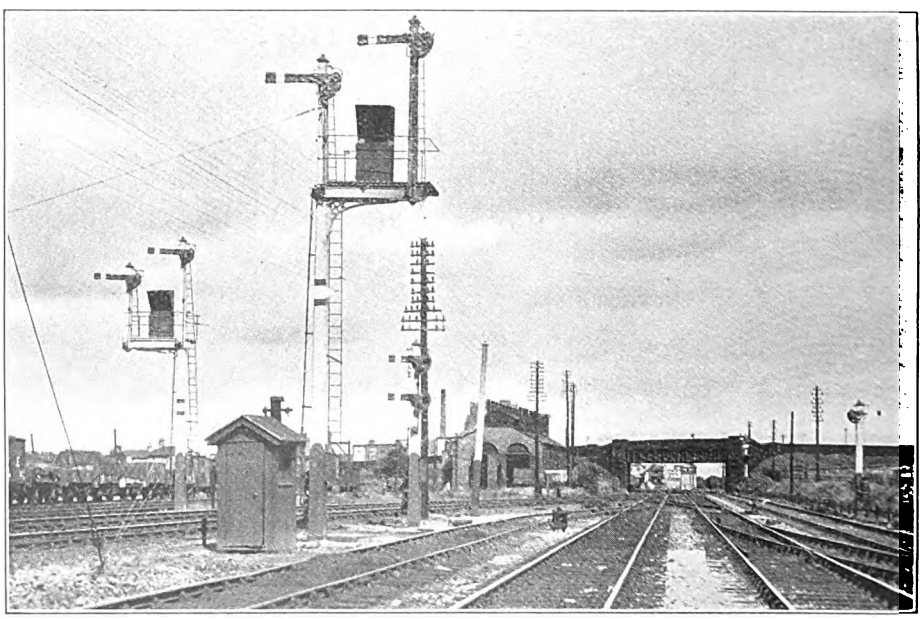


SOUTH CABIN AND UP STARTING SIGNALS.



SOUTH CABIN DOWN HOME SIGNALS AND ROUTE LIGHT INDICATORS.

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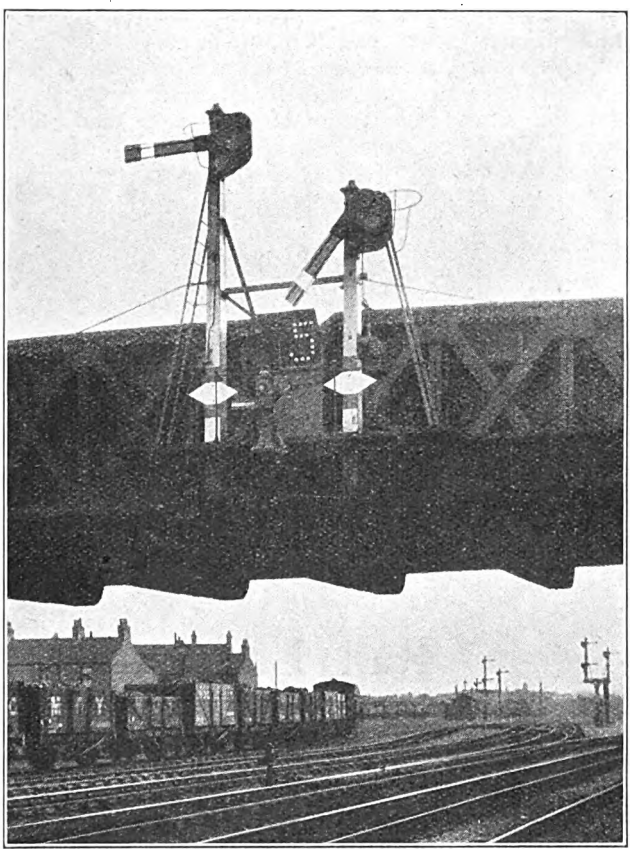
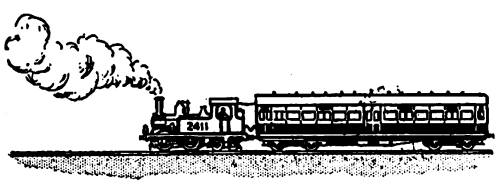
down home signals to the platform or through road, the giving of the "clear road" signals is dependent on the running signal ahead being "off." The "warning" signal is given when the running signal ahead is at "danger," and the train has been brought to or nearly to a standstill, on a short length of track circuit approaching the "warning" signal.

All switches on the passenger lines are locally track-locked and route-locked where necessary by a train entering on the track circuits within the signalled area, and freed when the train clears the fouling point of each successive switch. All switches are detected with their respective running signals or dwarf signals on the permanent detection principle. Dwarf signals precede the running signals to obviate passing signals at "danger." Day colour light signals are used at the platform home signals adjacent to the scissors crossings as being more convenient for fixing under station roofing. All the up and down distants are fixed at the "danger" position.



UP INNER HOMES, ROUTE LIGHT INDICATOR AND CALLING-ON ARM.

The next morning the members inspected the new four-aspect colour light signalling and all-electric signalling at Cannon Street, Charing Cross, and Blackfriars Junction, S.R.



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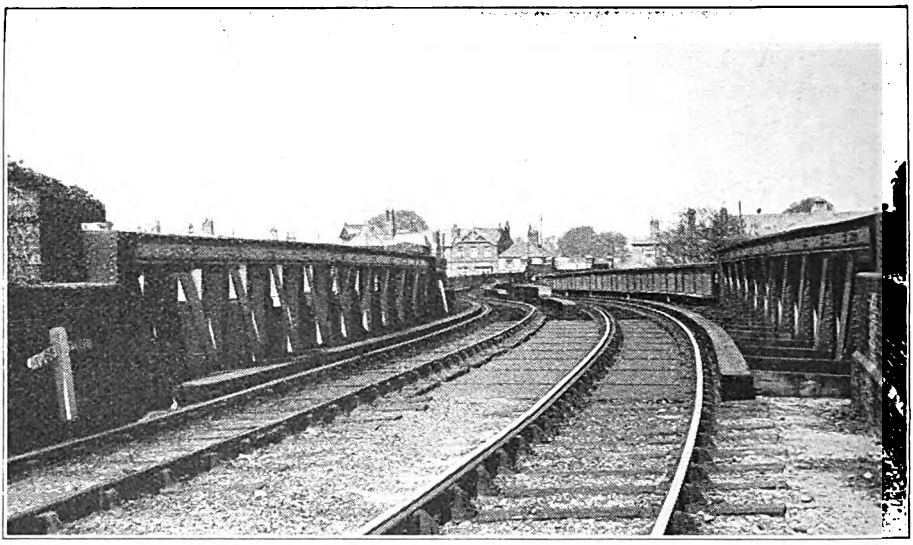

Photo] [*F. Burtt.*

TRACK CONSTRUCTION ON VIADUCT NEAR LEWES, S.R.

Rail Laying and Relaying.

By R. S. SCHOLEFIELD, A.M.Inst.C.E.

I.—LAYING NEW PERMANENT WAY.

THE economics of rail-laying demand an ample supply of materials at the rail head, and at the same time a sufficient number of skilled men to handle the materials upon arrival.

The formation or bottom ballast usually consists of large stones over which it is difficult for the men to walk, especially when they are carrying heavy weights. On the other hand, the smaller ballast used above the formation ballast is not required until the sleepers and rails are laid down, and, in fact, new ballast would not be very much better to walk over than the larger formation ballast. For these reasons the men should have as little walking over the ballast as possible. The sleepers are always required ahead of the rails and top ballast, and to obviate the need for walking and carrying, the sleepers should always be delivered first, and the rails and fastenings next, as near as possible to the rail head.

Probably the materials will be delivered by means of a special permanent-way train, which will be pushed nearly up to the rail head by an engine working at the rear. In this case the sleepers will be in the first trucks, which are generally high-sided wagons. These will be followed by pairs of bolster wagons containing rails, and these again by more high-sided wagons containing the fastenings, such as keys, bolts, screws, spikes, &c.

If, as is usual, hand trollies are used, the whole train will be unloaded at one time, the rails will be deposited some distance behind the sleepers, and the smaller parts and fastenings some distance yet further back from rail head.

Each sleeper wagon may, perhaps, carry over 30 chaired sleepers, and each rail wagon may perhaps have brought 12 rails, if these are of the usual weight, and 30 ft. to 33 ft. in length. With the comparatively light 80 lb. bull-headed rails of 33 ft. length, the weight will be

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880 lb., and if lifted by 15 men the load will be a little over 58 lb. per man. For heavier rails, of course, more men or tackle will be required. The chaired cross sleepers weigh 200 lb., and three men lifting them will have to carry nearly 67 lb. per man.

The unloading of the train will require about six men in each sleeper wagon and eight men in each rail wagon (for 80 lb. rails); and the number of wagons sent on the special train will depend upon the size of gang that is available for the unloading.

Hand trollies are used for the actual conveyance of the material from the place of unloading up to the rail head. These trollies are of such a size and weight that they can be easily lifted off the rails, and on again, when required to be loaded, or after unloading, by four or five men. This lifting of the trollies off the rails is essential if the rails are to be deposited on the sleepers with the minimum amount of walking backwards and forwards. The sleeper trollies are brought by hand right up to the rail head, and the sleepers are placed at the side of the rails already laid.

The arrangement will probably be one trolley containing, say, eleven or twelve sleepers; then a second trolley containing a couple of rails and the necessary small parts such as fastenings. These are followed by other trollies again containing sleepers and rails alternately, the trollies each being lifted off the rails and placed at the side of the line as quickly as they are unloaded. Immediately the sleeper trolley has been unloaded, the sleeper gang carries the sleepers forward and places them in their approximate position on the bottom or formation ballasting.

The sleeper trollies are then lifted off the track, and the rail gang brings up the rails and places them upon the sleepers. The rail trolley is next lifted off the rails, and the next sleeper trolley is brought up to the work.

The fishing and keying is going on at the same time, and the smaller trollies may be brought up over rails already laid before the fishing and keying is completed, but the heavier wagons must not yet be brought up before the fishplates and keys are in their proper place.

As soon as possible the empty sleeper and rail trollies must be lifted on to the rails again and taken back to the place where the permanent-way train was unloaded in the first case. It is obvious therefore that the disposition and arrangement of the several gangs should be very carefully planned to avoid one set of men waiting for another set, and so that there shall be no interval during which any of the men are standing idle.

In a gang of 80 men, perhaps 30 will be engaged in loading and pushing half a dozen hand trollies, 5 men to each; another 30 men will be set on to handle the rails say 15 to each rail, and the remaining 20 men will be told off to adjust the sleepers to fish and key them, and roughly level them so far as this can be done before the finer top ballast is laid down.

It has been found that by this arrangement of hand trollies, and a gang of 80 men the permanent way can be laid at the rate of 2·6 minutes per rail length of 33 ft., or 1 mile in 7 hours.

Sometimes the work is done without the use of hand trollies, the permanent way material train being backed by engine power right up to the rail head. The train is marshalled exactly as before, with the sleepers first, the rails next, and the fastenings last, the engine again pushing up from the rear. The train will not now be entirely unloaded at one time, but sleepers rails and fastenings for 2, 3, or 4 rail lengths will be thrown over the side at one time, the train being pushed on at intervals when this length of permanent way is laid, fished, and keyed. It was found that with this arrangement of direct laying without hand trollies, and a gang of 120 men, four rail lengths could be laid in 16 minutes, or 4 minutes for each length of rail.

The following suggestion was issued by the War Office some time ago. The supply train was to be arranged and pushed by the engine at the rear as just described. Material for 4 rail lengths was to be unloaded at one time, and thrown on the side of the line as near as possible to the rail head, say at 4 rail lengths away. Twelve hand trollies were to be employed, six of which were to be used for pushing sleepers and rails to the rail head, whilst the other six trollies were being loaded up in front of the material train.

It was suggested that the platelaying gang should consist of 140 men. Of these

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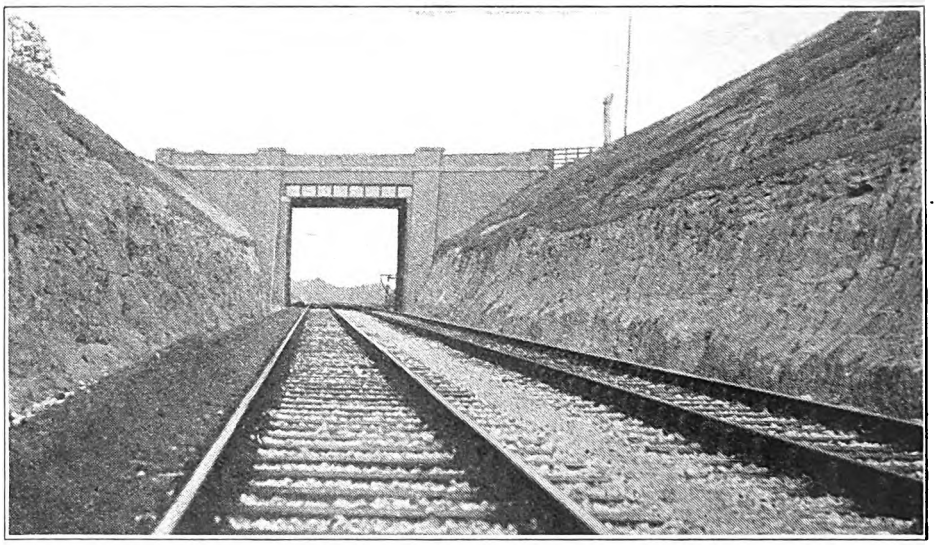
48 were to be employed in pushing the trollies to the rail head, 18 in loading the trollies with rails, and 24 in loading them with sleepers, a total of 90 men being engaged in feeding the men actually engaged in placing the sleepers, rails, and fastenings in position. The number of men at the rail head was to be 50, half of them working for 5 minutes, and the other half resting for 5 minutes, alternately.

It was considered that the unloading of the train and the backing away would occupy four minutes, the first two trollies of sleepers and rails could be loaded and pushed up in 1½ minutes from the time the rails were cleared by the backing of the train, and the rail gang would be able to work at the rate of two minutes for each rail length, being kept thoroughly supplied without a check. Immediately the six trollies were loaded up, and whilst they were being pushed up to rail-head, the material train would be again moved forward and another lot of material for four rail lengths unloaded.

Of course, this sort of thing cannot go on indefinitely, as there comes a time when the material train becomes empty and more sleepers and rails must be fetched up from the depot or place of stacking. But the rail-head gang should be kept employed during the absence of the material train, and with this in view, if it be known that the train will be away, say, 24 minutes (20 minutes for journey backward and forward and four minutes for loading at the depot), the last 12 or 15 rail lengths of material left in the train should be unloaded at the same time, so that it can be taken up to the front and used whilst the train is away.

In addition to the gang of 140 men employed at or near the rail-head, other men will be required for unloading the material train—say, three men in each of the sleeper wagons and six men in the rail wagons. It was estimated that with these arrangements the permanent way could be put down at the rate of two miles per day of 12 hours; or, if three gangs were used to work in shifts of eight hours each, night and day, a total of 3½ miles could be laid in a period of 24 hours.



TRACK CONSTRUCTION IN CUTTING ON NEW LINE.

The ballasting of the line must be carried out before engines are permitted to travel over it at speed. One ballast wagon generally holds about 6 tons of slag or granite ballast, a quantity generally sufficient for 4 lineal yards of track. The ballast is shovelled over the side of the wagons and heaped at the side of the line, care being taken that the lines are not fouled for the subsequent running of the

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same or other trains. The train is pushed forward at intervals as required.

The number of ballast wagons should, of course, be limited by the size of the ballasting gang.

Flat-footed rails are laid in most cases abroad, and have been frequently used by our army in the field. In this case the rails may be comparatively light—say, of 56-lb. section for a 4-ft. 8½-in. gauge—and will probably be in short lengths, say, of 24 ft. The length of train and weight of material carried will depend upon the difficulties of the curves and gradients and the power of the engines available for the work.

Each rail will weigh 4 cwt. and can be handled by eight men. The sleepers will be of the size (9 ft. by 10 in. by 5 in.) usually adopted for this gauge and will weigh about 1 cwt. each—not too great a load for two men. The hand trollies will each carry, say, eight rails, or 40 sleepers, and will probably work up to rail-head in pairs, carrying 16 rails and 80 sleepers. Immediately the trollies are unloaded they will be lifted clear of the line to enable the next two pairs of material trollies to come up.

Assuming that 48 men are available for use in six rail parties of eight men each, the arrangement would require a sleeper party of 54 men, divided into three groups of 18 men each, for handling nine sleepers to each rail. The 27 sleepers would first be put down for three lengths of rails and properly spaced, and these would be immediately followed by the rail parties carrying and laying the six rails on the sleepers. The fish-plates would be secured in the first case at the joints by two bolts only, and the spikes would be put in only at the ends and middle of the rail. This would enable the next set of trollies to travel over the rails and bring up more materials.

As soon as the last trolley is unloaded the empty trollies would be again lifted on to the line and run back by the trolley-men for another load. The fastenings such as fish-plates, bolts and spikes, would be kept on a leading trolley which need never be derailed. Under these conditions it would never be necessary to carry the rails by hand a greater distance than the length of a couple of rails. As many rail and sleeper trollies as can be obtained should be used for the work, to avoid as much as possible running back to the wagon-unloading place for more materials.

The fish-plates at each joint will be fixed and bolted by two men, and the expansion wedge (for description *see* later) will be dropped into place. No joint can be fished until the last joint has been bolted up and at least some of the spikes are driven. Two men are required to drive one spike, one to lift up the sleeper to the rail by means of a crowbar and the other to drive the spike. For each sleeper, therefore, four men are working at one time. Perhaps three of these spiking parties will be required for economy of time, and will work alternately in front of each other.

The ballasting and packing should not be done by the first or relaying gang, as this would only cause delay. The formation or bottom ballast is generally sufficiently level for the permanent way to lie without packing, and the light class of engine that would be used for backing up the wagons would safely run over the line, at slow speed, before the full ballasting is done. About 40 men would be employed to move ten trollies and, say, 32 other men for fixing the fishplates, securing the bolts, and spiking down the rails, making a total with the 48 plus 54 men previously referred to of 174 men in the gang. The speed of the work may be assumed to be at the rate of one mile in, say, 9½ hours.

Generally, a lot of 24 ft. rails can be carried on single "ballast" wagons, but if the rails are longer than this, twin wagons will be necessary. Each should be provided with two bolsters, one above the other, the lower one fixed to the wagon, and the higher fixed at the centre only so that it can turn partly round when the train is travelling over curves. The speed of platelaying may sometimes be enhanced if cottar bolts are used in lieu of the ordinary nut bolts.

In time of war the experiment has been tried of allowing traffic to run over the line, temporarily omitting the fish-plates; but there was always an element of unsafety in this plan, and a breakdown or derailment might have taken more time to rectify than would have been occupied in the proper fishing of the whole of the joints.

The first platelaying gang would be succeeded as quickly as possible by a

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second party consisting of, say, 64 men, 24 of whom would be engaged in driving in all the spikes not already driven, 24 other men to deal with the packing of the sleepers to give a running level to the rails and a good bed to the sleepers, and 16 men to complete the bolting of the fish-plates, and the slewing and alignment of the track. The proper ballasting of the line would probably be done by another and third gang, but if the line be for military use alone it is doubtful whether this would be done for some time after the line was in use for traffic.

(To be continued.)

RHAYADER–LLANGURIG–ABERYSTWYTH SECTION, MANCHESTER AND MILFORD RAILWAY.

In reply to an enquiry from Mr. J. Jackson our old contributor, Mr. T. R. Perkins, of Henley-in-Arden, writes as follows :—

"The original scheme of the 'forties was for a line connecting Crewe (for Manchester, to which a line already existed) with Milford Haven; 86 directors were appointed, but lack of funds and inability to raise the necessary capital caused its abandonment. In the 'sixties a new 'Manchester and Milford' scheme was projected, to make a line between Llanidloes and Pencader, with a branch to Aberystwyth; north of Llanidloes and south of Pencader other lines were already in existence or authorised. From the junction with the Mid-Wales Railway at Penpontbren, about two miles south of Llanidloes, construction proceeded for some three miles to Llangurig, in the upper Wye valley; the southern half (Pencader-Strata Florida) and the branch from Strata Florida to Aberystwyth were also constructed. But the financial difficulties which beset all the railways about 1866 made the construction of the difficult central section quite impossible; the already constructed line connecting Llangurig with the Mid-Wales Railway was abandoned, and the Pencader-Aberystwyth portion remained as the whole of the M. & M.R. until its absorption by the G.W.R. in 1907. I never heard of any 'Manchester and Milford' scheme for serving Rhayader, which is on the Mid-Wales line connecting Llanidloes with Brecon; but an old map of mine shows a projected line running from Penybont (on the L. & N.W.R. east of Llandrindod Wells) to Rhayader and thence up the Elan Valley to join the M. & M.R. Llangurig-Strata Florida line. North of Strata Florida a direct curve into the Aberystwyth branch is shown, and, in construction, the line would have given a direct route from Rhayader, Knighton, Brecon, &c., to the coast at Aberystwyth. Needless to say, the scheme never even obtained Parliamentary sanction (as far as I am aware)."

Mr. Perkins also comments as follows :—

"It seems that the 'Mid-Wales' Railway obtained an Act for a line from Llanidloes to Aberystwyth, as well as to Brecon, and by some oversight the 'Manchester & Milford' were also granted powers over a good deal of the same route. This was in 1860, and the discovery of the fact caused the 'M. & M.,' who had already commenced the construction of the line as far as Llangurig, to abandon it in 1862 in favour of running powers over the Aberystwyth line of the 'Mid-Wales' to Ysyptty Ystwyth, whence they intended to construct a connecting line to their own main line at Strata Florida. But the 'Mid-Wales' fell on evil days, and never succeeded in raising the capital for the Aberystwyth line, which was abandoned by Act of 1876. The 'M. & M.' being equally impecunious, the already-constructed line to Llangurig was left 'high and dry' 17 or 18 miles from the nearest point on its system, and so became derelict. I see also on page 60 of the 'Story of the Cambrian' that while the present line between Newtown and Machynlleth was still 'in the air,' the L.N.W., Mid-Wales and M. & M., together with the Bishop's Castle, were mixed up in the scheme for connecting Aberystwyth and Llanidloes—evidently the Mid-Wales line via Yspytty Ystwyth."

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British Locomotive Practice and Performance.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

THE LOCOMOTIVE EXCHANGE, G.W. AND L.M.S. RAILWAYS.

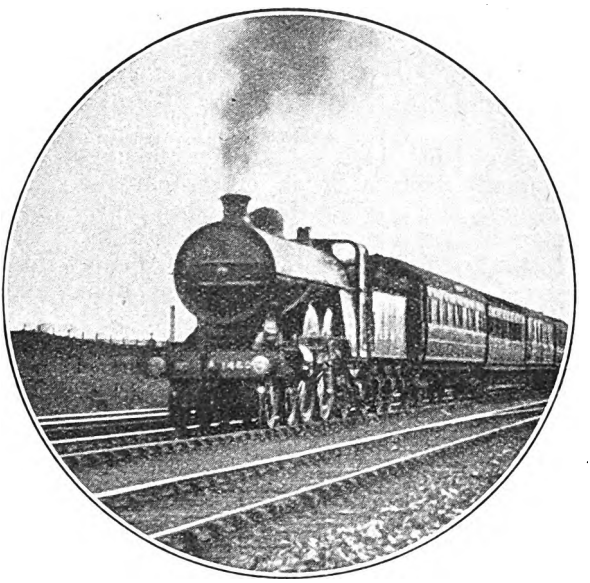

Photo.] [*J. F. Dearden.*

DOWN NEWCASTLE EXPRESS, L.N.E.R.
Great Northern 4-4-2 locomotive No. 4460.

IN no sense was this exchange of express locomotives, which took place towards the close of last year, a "competition." In view of the disparity in size, weight and tractive power of the two engines, indeed, there was little basis for a detailed comparison of their performances on any equal footing. The Great Western engine was lent to the L.M.S.R. in order that investigation might be made of the efficiency of her performance on the maximum duties of the Western Division main line, between Euston and Crewe; by way of balancing matters, a Midland compound was loaned to the G.W.R. for the same period, and worked on some of the more suitable Great Western main-line duties. In the nature of things, as the Great Western "Castle" proved herself throughout the tests to be more than equal to every proposition of haulage which was put to her, including some of exceptional severity, and in particularly bad weather, the chief interest of the exchange centres in her performances.

It was one of the latest "Castles"—No. 5000, *Launceston Castle*—that passed on to L.M.S. metals, and during the period of the trials she was housed at Crewe South Shed. With her went over that prince of Great Western drivers—W. Young, of Old Oak, who, the previous year, with *Pendennis Castle*, had been responsible for such remarkable running on another "foreign" line—and one imagines that it would have been almost impossible, in these trials, for any driver to have got better work out of his engine than that for which Young was responsible. It was not so much that record times were made. Time certainly was gained steadily on most of the trips made by *Launceston Castle*, but, on the other hand, I could match, from past records, many of the point-to-point times made by the Great Western engine over various stages of her journey, and, indeed, so far as concerns the ascent of Shap, could produce superior times, by London & North Western engines. The impressive feature of the running, however, was the superlative and noiseless ease with which the "Castle" set about her work—in itself a sure index of low coal consumption. It was clear that Young was, of set purpose, refraining from the spectacular—as he did equally on Great Northern metals—while at the same time keeping well on the right side of his schedule times, in order to work his engine at the most economical figure possible in coal and water consumption. That he succeeded in this aim is proved by the fact

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that the power output of the engine in proportion to fuel burned was the highest yet recorded on London and North Western metals.

I have thought it well to give this preliminary explanation in order that the running data given in the subjoined tables may be assessed at their correct value. In the first two weeks of the trials, *Launceston Castle* worked the 10.50 a.m. from Crewe non-stop to Euston, allowed 175 mins. for the 158 miles, working back on the alternate days with the 10.30 a.m. from Euston to Crewe, also non-stop in the same time. In the earliest stages, the load was made up to 390 tare tons; it was then advanced to 450 tons, and, finally, to 490 tons, meaning a gross load behind the tender of about 510 tons. There was then an *interregnum* of a week, while preparations were being made for the Crewe-Carlisle trials. In the first week of these, the "Castle" took the normal tare load of the 1.10 p.m. out of Crewe (the combined Glasgow and Edinburgh portions of the 10 a.m. down, which by rigid curtailments of rolling-stock during the strike period had been brought down to a total of under 300 tons), booked over the 141 miles to Carlisle in 165 minutes, and on alternate days returned with the 12.20 p.m. from Carlisle to Crewe, similarly loaded and allowed in this direction 176 mins. The second of the Shap weeks was the culminating week of the trials. To the trains the dynamometer car was added, the loads north and south-bound respectively on the Tuesday and Wednesday being made up to 400 tare tons, and on the Thursday and Friday to 430 tare tons, or about 450 full tons behind the tender. The worst proposition of the whole month was the Thursday of this final week, when the engine had to go over Shap with this load, unassisted, in a gale of wind and rain.

We will now revert to the running between Euston and Crewe, in order to examine it in more detail. On the first up journey, with the 10.50 a.m. from Crewe—on which I was unfortunate enough not to be a passenger—Young left Crewe 3 minutes late and passed Tring 9 minutes early, having covered the 126·5 miles in 129 minutes. After that things were taken easily down to Euston, and with the assistance of two bad p.w. checks—at Wembley and Willesden—the arrival was 7 minutes early, the engine having gained 10 minutes actual time, and at least 14 minutes net. Next day I was a

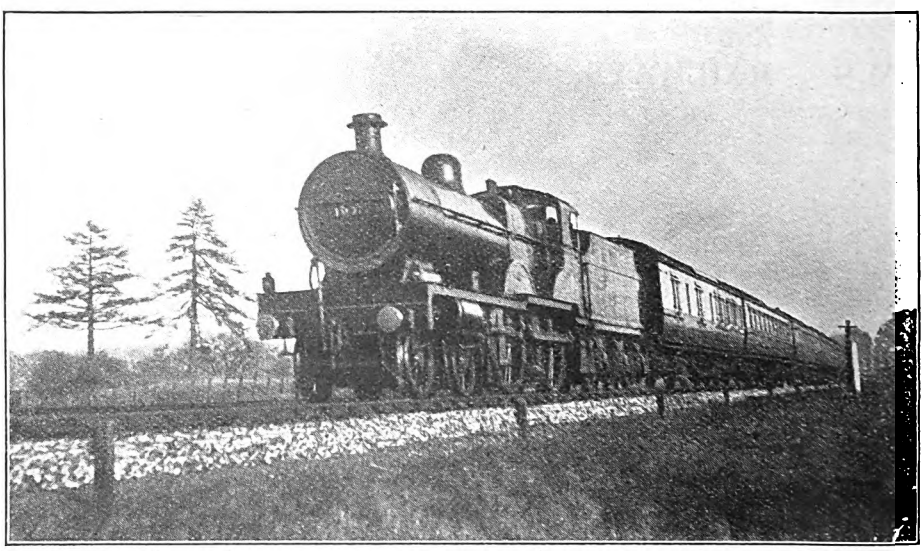

Photo.] [*D. L. Rumble.*

G.W.R.–L.M.S.R. LOCOMOTIVE EXCHANGE. 1.15 P.M. PADDINGTON-BRISTOL EXPRESS NEAR READING, G.W.R.

L.M.S.R. 3-cylinder compound 4-4-0 No. 1047.

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passenger on the 10.30 a.m. down, and my run figures in the first column of the Euston-Crewe table. As before, we had the Willesden and Wembley slowings, which appear on each of the runs, and then Young drove in a distinctly leisurely fashion as far as Rugby. But now, after a slowing to 25 m.p.h. for p.w. repairs at Clifton Road, we had a flash of Great Western brilliance, which did not fail to show itself somewhere on practically every run that the engine made. From the 25 m.p.h. at Clifton Road we had accelerated to 48½ on passing Rugby No. 7 box, in less than 1½ miles of practically level track, to 52 at the troughs and 58½ at signal check, from 68 to 30 m.p.h., at Castlethorpe, although the engine picked up well, attaining 64½ m.p.h. on the slight rise past Bletchley and Leighton, and only falling to a minimum of 55 up the 1 in 330 to Tring Summit, which was passed 4½ min. early. The next trouble was a dead stop of 30 sec. for adverse signals between Tring and Berkhamsted; yet, despite this, by the aid of brisk downhill running, which reached a maximum of 76½ m.p.h. before Wembley, Willesden would have been passed 2½ min. early, had it not been for the Wembley and Willesden slowings, which brought the train into Euston 2½ min. late. Judging by the running on the up

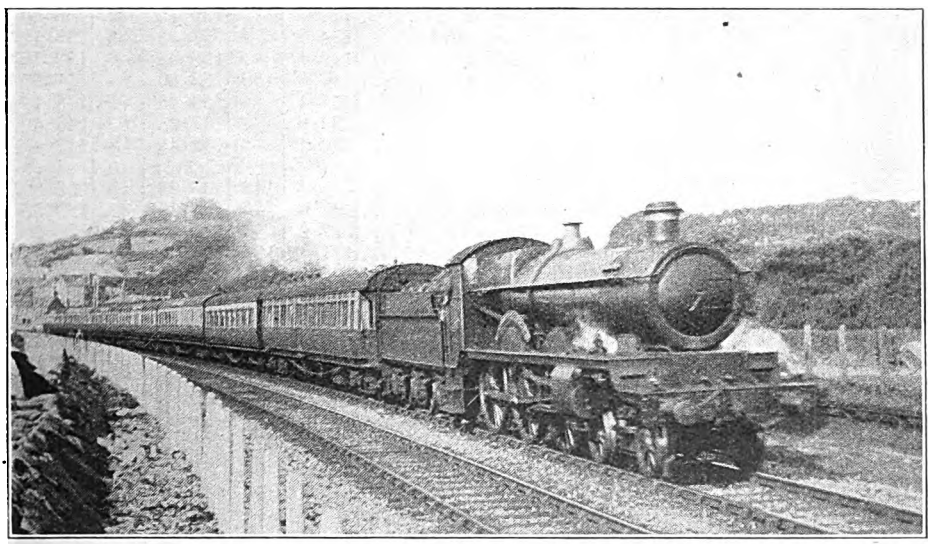

Photo.] [*P. Ransome-Wallis.*

UP CORNISH RIVIERA EXPRESS LEAVING PENZANCE.
Four-cylinder 4-6-0 locomotive No. 4010, "Western Star."

Brinklow, after which we went ahead in such style as to complete the 51 miles from Rugby to Stafford in 49¾ min. Running very gently from Stafford onwards, we made Crewe in 171 min. 5 sec. actual time, and about 167 min. net, or 8 min. under schedule.

Next follows the up journey of the following day, with a load almost identical. There were no features of special note in the running as far as Lichfield, but after touching 74 m.p.h. on the descent to Hademore troughs, the "Castle" began to gain time, and was just over 5 min. ahead on passing Roade. Then came the bad trip subsequently recorded, however, the net time from Crewe to Euston could not have exceeded 164 min. for the 158 miles, or 11 min. under schedule.

Of the doings of *Launceston Castle* during the remainder of this week I have no record, but the runs already described were, I believe, quite typical. The following Tuesday, when I arrived at Euston, it was to find the load of the 10.30 a.m. down increased, by the addition of empty stock, to 451 tare tons, and we went out with about 470 gross tons behind the tender. On this occasion a signal check, to walking pace, at Kilburn was added to the slowings

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EXPERIMENTAL RUNS BETWEEN EUSTON AND CREWE, L.M.S.

Engine: Great Western Railway four-cylinder 4-6-0 No. 5000, *Launceston Castle*. Driver: W. Young.

10.30 a.m. Euston-Crewe.						Train.	10.50 a.m. Crewe-Euston.					
Schedule.	Oct. 21. 55 390 410	Speeds, m.p.h.	Oct. 26. 62 451 470	Speeds, m.p.h.	Distance.	Date .. .. Load (axles) .. ,, (tons tare) ,, (tons full) ..	Distance.	Schedule.	Oct. 22. 54 388 405	Speeds, m.p.h.	Oct. 27. 70 489 505	Speeds, m.p.h.
min.	m. s.		m. s.		miles.		miles.	min.	m. s.		m. s.	
0	0 00	—	0 00	—	0·0	Euston	158·1	175	177 55	—	173 25	—
—	3 50	—	4 20	—	1·2	Camden No. 1 ..	156·9	—	174 15	—	169 25	—
—	p.w.s.	—	sigs.	5	—		—	—	—	50	—	50
10	10 05	20	12 50	20	5·4	†Willesden Jc. ..	152·7	167	167 25	20	163 45	25
—	p.w.s.	30	p.w.s.	30	—		—	—	p.w.s.	30	p.w.s.	35
—	14 50	—	17 55	41	8·1	Wembley ..	150·0	—	162 00	76½	159 35	77½
—	19 05	49	22 35	44	11·4	Harrow	146·7	—	159 15	74	156 50	72
—	21 25	50	25 05	46	13·3	Hatch End ..	144·8	—	157 35	65	155 10	68
—	24 40	51	28 25	—	16·0	Bushey	142·1	—	155 05	—	152 45	—
24	26 05	58½	30 00	57	17·5	Watford	140·6	155	153 50	—	151 30	72½
—	29 40	58½	33 45	57½	21·0	King's Langley ..	137·1	—	150 45	72½	148 40	76½
—	33 20	57	37 35	53	24·5	Boxmoor.. ..	133·6	—	147 25	57½	145 40	—
—	37 05	53½	41 35	49½	28·0	Berkhamsted ..	130·1	—	142 45	—	142 40	68
									sig.stop	0		
40	41 25	52	46 05	48½	31·7	Tring	126·4	141	136 25	55	138 50	52½
—	45 45	69	50 30	71½	36·1	Cheddington ..	122·0	—	131 30	57	133 55	60
—	49 25	67	54 00	68	40·2	Leighton ..	117·9	—	127 20	64½	129 50	62
54	55 35	60	59 45	68	46·7	Bletchley ..	111·4	124	120 25	56½	123 40	68
—	61 10	66	64 55	70½	52·5	Wolverton ..	105·6	—	113 35	—	118 20	‡63½
									sigs.	30		
—	63 25	—	67 05	—	54·8	Castlethorpe ..	103·3	—	110 10	68	116 20	75
67	68 50	51	72 30	52	59·9	Roade	98·2	110	104 50	57½	111 40	57
70	71 55	—	75 40	65	62·9	Blisworth ..	95·2	107	101 50	—	108 40	—
—	78 40	62½	82 00	66	69·8	Weedon	88·3	—	95 35	72½	102 25	72½
—	84 30	53	87 45	53½	75·3	Welton	82·8	—	90 30	—	97 05	—
—	—	66	—	62½	80·3	Hillmorton Box	77·8	—	84 25	46	90 45	45
—	p.w.s.	25	—	—	—		—	—	—	—	—	—
92	93 00	—	95 20	30	82·6	*Rugby	75·5	85	81 05	35	87 10	—
—	94 05	48½	96 30	—	83·2	*Rugby No. 7 ..	74·9	—	80 00	—	sig. stop	0
—	99 35	58½	102 15	57½	88·1	Brinklow.. ..	70·0	—	75 10	64½	78 20	—
—	102 55	57	105 40	56½	91·4	Shilton	66·7	—	71 55	66	75 05	63½
—	105 10	61½	107 55	60	93·5	Bulkington ..	64·6	—	69 35	53	72 40	52½
108	108 25	71½	111 15	70½	97·1	Nuneaton ..	61·0	69	65 35	62	68 40	62
—	113 00	64½	115 55	65	102·3	Atherstone ..	55·8	—	60 20	55½	63 15	55
—	116 40	71½	119 35	71½	106·5	Polesworth ..	51·6	—	56 05	57½	58 55	58½
122	119 40	71½	122 40	70½	110·1	Tamworth ..	48·0	55	52 40	74	55 35	72
128	125 20	57	128 20	56½	116·3	Lichfield*.. ..	41·8	48	47 15	—	50 05	—
—	130 20	—	133 10	64	121·1	Armitage.. ..	37·0	—	42 35	62	45 25	59
136	133 20	66	136 10	66	124·3	Rugeley	33·8	40	39 30	65	42 20	65
—	136 05	—	138 55	61½	127·2	Colwich	30·9	—	36 40	60	39 30	58½
—	138 15	60	141 10	—	129·6	Milford	28·5	—	34 15	58	37 00	55½
—	—	35	—	40	—	*Trent Valley Jc.	—	—	29 55	35	32 40	40
146	142 45	—	145 40	—	133·6	Stafford	24·5	30	28 55	—	31 45	—
—	147 00	51	149 40	53	136·9	Great Bridgeford	21·2	—	25 45	72½	28 40	70½
153	149 20	53	151 55	53½	138·9	Norton Bridge ..	19·2	24	24 05	72½	26 55	67
—	154 30	54	157 00	55	143·5	Standon Bridge	14·6	—	20 05	—	22 45	64½
164	159 15	51	161 30	52½	147·6	Whitmore ..	10·5	15	16 00	—	18 25	—
—	162 05	—	164 15	—	150·2	Madeley	7·9	—	12 45	47	14 55	37½
—	165 05	70½	167 20	65	153·4	Betley Road ..	4·7	—	8 30	45	10 00	40½
—	167 25	—	169 55	—	156·0	Basford Sdgs. Box	2·1	—	5 00	36	5 55	35½
175	171 05	—	173 25	—	158·1	Crewe	0·0	0	0 00	—	0 00	—
175	167	—	167	—	158·1	Net times (min.)	158·1	175	164	—	166½	—

* Service slack. † Special slack on all runs. ‡ Min. between Wolverton and Bletchley.

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EXPERIMENTAL RUNS BETWEEN CREWE AND CARLISLE, L.M.S.

Engine: Great Western Railway 4-cylinder 4-6-0 No. 5000, *Launceston Castle*. Driver: W. Young

Load: 57 axles (including dynamometer car) : 400 tons empty, 415 tons full.

1.10 p.m. Crewe–Carlisle.				Train.	12.20 p.m. Carlisle–Crewe.			
Distance	Sched.	Actual	Speeds		Distance	Sched.	Actual	Speeds
miles.	min.	min. sec.	m.p.h.		miles.	min.	min. sec.	m.p.h.
0·0	0	0 00	—	Crewe	141·0	176	168 15	—
4·9	—	8 20	58½	Minshull Vernon	136·1	—	159 40	—
—	—	—	—	—	—	—	sig. stop	0
8·8	10	12 00	71½	Winsford Junction ..	132·2	165	152 30	—
11·8	—	14 35	68	Hartford	129·2	—	149 20	—
14·4	—	16 50	72½	Acton Bridge	126·6	—	146 40	60
16·2	18	18 25	*65	Weaver Junction	124·8	157	144 50	59
18·8	—	20 45	62½	Preston Brook	122·2	—	142 00	52½
21·3	—	22 50	74	Moore	119·7	—	139 30	62
22·4	—	23 50	64½	Acton Grange	118·6	—	138 10	48½
—	—	p.w.s.	25	—	—	—	—	—
24·1	28	26 25	48	Warrington	116·9	148	136 05	—
27·5	32	30 30	55½	Winwick Junction ..	113·5	144	132 40	67
29·9	—	33 10	50½	Golborne Junction ..	111·1	—	130 00	—
33·2	—	36 45	64	Bamfurlong	107·8	—	sig. stop	0
							123 40	64½
35·8	41	39 15	57½	Wigan	105·2	135	121 05	*52
38·1	—	41 50	46	Boar's Head	102·9	—	118 50	63½
39·1	45	43 10	50	Standish	101·9	131	117 50	—
41·6	—	46 15	47½	Coppull	99·4	—	114 50	46
44·2	—	48 35	71½	Balshaw Lane	96·8	—	111 50	58½
45·5	53	49 40	*65	Euxton Junction ..	95·5	124	110 25	—
48·7	—	52 35	67	Farington	92·3	—	106 15	44
51·0	61	55 35	*25	Preston	90·0	116	102 45	*31
52·3	64	58 20	35	Oxheys Box	88·7	113	100 40	64½
55·7	—	62 50	55½	Barton	85·3	—	97 25	66½
58·4	—	65 30	65	Brock	82·6	—	95 00	69
60·5	72	67 30	65	Garstang	80·5	105	93 20	—
63·7	—	70 30	64	Scorton	77·3	—	90 05	66½
67·6	—	74 10	67	Galgate	73·4	—	86 00	55
70·9	82	77 10	65	Lancaster Junction ..	70·1	94	80 55	—
							sigs.	25
72·0	84	78 10	68	Lancaster	69·0	92	79 30	—
75·1	—	80 50	71½	Hest Bank	65·9	—	76 30	—
78·2	90	83 40	65	Carnforth	62·8	85	73 45	71½
82·7	—	88 20	50½	Burton	58·3	—	69 00	—
							sigs.	40
85·5	—	91 00	59	Milnthorpe	55·5	—	65 40	72½
87·4	—	93 00	51	Hincaster Junction ..	53·6	—	64 05	72½
91·1	104	97 30	43½	Oxenholme	49·9	72	60 55	—
94·5	—	103 00	34½	Hay Fell Box	46·5	—	58 05	80½
98·1	—	110 00	26½	Grayrigg	42·9	—	54 55	62
99·9	—	112 30	51	Low Gill	41·1	—	53 10	64½
104·1	122	116 40	66	Tebay	36·9	58	49 15	72½
107·1	—	120 20	32	Scout Green Box ..	33·9	—	47 00	86½
109·7	133	126 40	20	Shap Summit	31·3	52	44 30	41
111·7	—	129 30	57⅓	Shap	29·3	—	41 30	36
115·4	—	132 30	72½	Thrimby Grange Box ..	25·6	—	36 20	39
119·0	—	135 55	79	Clifton	22·0	—	30 30	—
122·1	—	138 30	*57	Eamont Junction ..	18·9	—	27 15	62
123·2	147	139 40	*57	Penrith	17·8	29	26 10	—
128·0	152	144 15	69	Plumpton	13·0	22	20 55	58½
130·3	—	146 15	70½	Calthwaite	10·7	—	18 00	47½
133·7	—	149 20	70½	Southwaite	7·3	—	13 40	41
136·2	—	151 35	*64	Wreay	4·8	—	10 05	36
139·7	—	154 45	71½	Carlisle No. 5	1·3	—	—	—
		p.w.s.						
141·0	165	157 00	—	Carlisle	0·0	0	0 00	—

*Service slack.

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through Willesden and Wembley, so that we passed Watford 6 min. late. Again the engine was not hurried, though we certainly did run at a rather higher speed than before from Tring down to Wolverton and, indeed, from there on to Rugby. But onwards from Rugby Young exactly repeated his running of the previous week; the minute correspondence of all the times between Brinklow and Stafford, with a difference in the train loads of 60 tons, was, indeed, extraordinary. So, without difficulty, we recouped all arrears, reaching Crewe in 173 min. 25 sec. from Euston, and again achieving, as nearly as I can reckon, a net time of 167 minutes.

three miles at 1 in 177 was 37½ m.p.h. On passing Nuneaton, Young had, however, picked up nearly 4 min. from Whitmore, the best of his work to this point having been the minima of 55 an hour up to Atherstone, and 52½ up past Bulkington. Then came the dead stand, for adverse signals, of 25 sec. at Rugby No. 7 Box. After this the work of the engine was brilliant indeed, especially up the rising grades from Wolverton to Tring, where the work reminded me of the companion effort of *Pendennis Castle* up Abbot's Ripton bank in the trials of 1925. The former distance of 20·8 miles was actually covered, with 505 tons, in

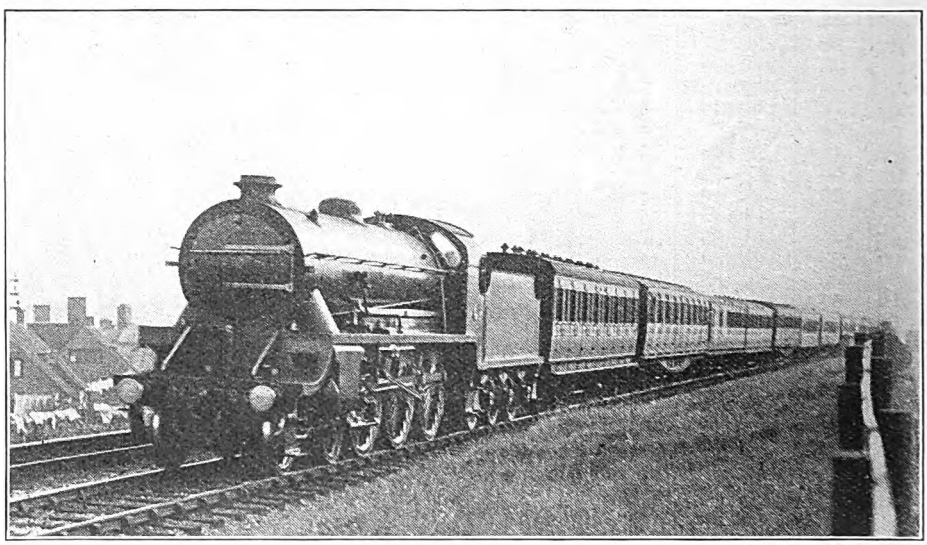

Photo.] BRIGHTON-VICTORIA EXPRESS, S.R. [*F. R. Hebron.*

4-6-0 locomotive No. 796E, "Sir Dodinas le Savage," with 6-wheeled tender.

Next day the tare of the up train had mounted to sixteen 8-wheeled and one 12-wheeled corridor vehicles, making a total of 70 axles and weighing 489 tons empty, and 510 tons with the complement of passengers and luggage. A late start of 3 min., together with a dead stand for signals at Rugby No. 7 box, gave Young just the incentive he wanted, and his running on this occasion was, perhaps, the most notable that he achieved on L.M.S. metals. It is not surprising that, with such a train as this, the engine dropped 3½ min. on the sanguine schedule of 15 min. for the first 10·5 miles up to Whitmore; the minimum rate on the

20 min. 30 sec., at an *average* speed of over 60 miles an hour. I should very much doubt if such a time as 15 min. 10 sec. from Bletchley up to Tring has ever been equalled in North Western annals, with a load such as this, or considerably less, and no pilot. With fast running down from Tring, there was ample time in hand to compensate for both Wembley and Willesden slacks, and, despite an extremely cautious entry to No. 2 platform at Euston, *Launceston Castle* came to rest 1½ min. early, having completed the journey from Crewe in a net time of 166½ min., or 8½ min. under schedule. She had made an actual time of 86¼ min. from Rugby,

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passed more slowly than usual, and a net time of 82¼ min.—or under "even time"—allowing in the calculation the full 8 min. of the working book inwards from Willesden, which is on the generous side. Of what was done in the down direction with the same load I have no record, but the work and times on the 470-ton down journey make it improbable that time-keeping gave Driver Young any concern.

After this the *venue* of the tests was moved further north. I have no notes as to what happened in the first week of the Crewe–Carlisle tests, while Young was accustoming himself, with moderate loads, to the road traversed. But I was able to reach Crewe in time for the first of the dynamometer car trials in the following week, and was privileged to witness the fine running that figures in the left-hand columns of the second table. Young followed the custom of bygone days in gaining all the time he could to Carnforth—in which he was aided by an entire and unusual absence of signal checks, and no more than one p.w. check—in order to allow of a not immoderately hard effort up Shap, on which climb, however, strict time was kept. I do not stress this moderation, as Young was clearly following his consistent policy of coal conservation by short cut-offs and easy working generally. That the engine was steaming well throughout the climb was evident by the fact that the "white feather" was showing from her safety-valves up both Grayrigg and Shap banks, from bottom to top. Beyond this, there is little comment to be made, full details of speeds being embodied in the table.

Everywhere the running times were very good, and finally, with a rapid—though not exceptionally rapid—descent from Shap into Carlisle, we pulled up at Citadel 10 min. early by the station clock. Actually the clock must have been slow, as our total time from Crewe was 167 min. exactly. Allowing for the Acton Grange check, and the concluding slowing, I should put the net time at 164½ min., or 10½ min. under schedule. Before the war the Glasgow portion of this train, leaving Crewe at 1.7 p.m., was allowed 169 min. for the same run, and the then 2 p.m. out of Euston was allowed 104 min. in which to make the 90-mile run from Preston to Carlisle, start-to-stop. Our time over the latter section was 101 min. 25 sec., or 101 min. net, from pass to stop.

On the following day, with the easier-timed up working, it seemed that Young

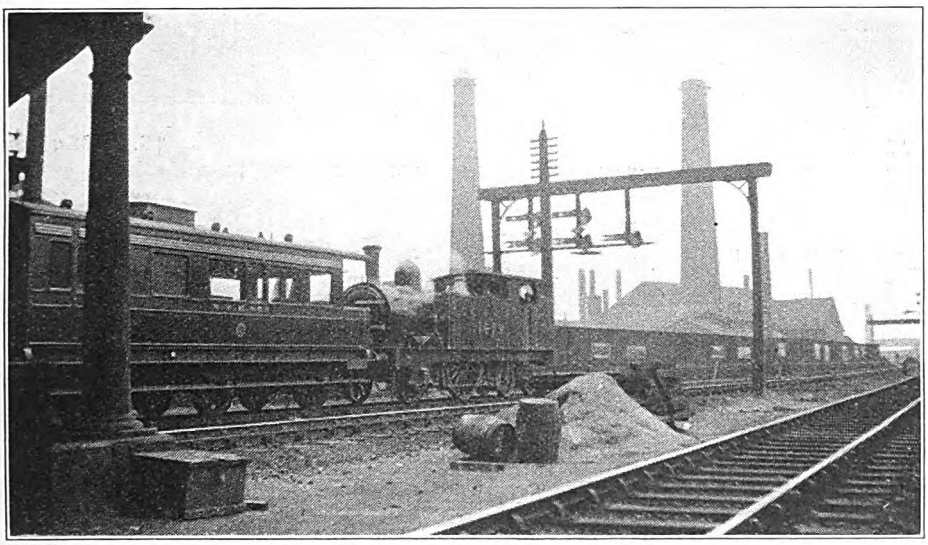

Photo.] [*A. P. Herbert.*

L.N.E.R. 2-2-4 TANK ENGINE No. 1679 ATTACHED TO OFFICIAL INSPECTION SALOON AT HOLBECK (LOW LEVEL), LEEDS.

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achievements with 415 tons. After that Young, not being altogether versed in traditional Shap descents, fairly let the engine go, with the result that 86½ m.p.h. was reached before Tebay, and a shade over 80 on Grayrigg, all necessary caution, of course, being observed at those curves where reduced speeds are desirable. The rapid recovery of speed after the Burton check is worthy of note, and also the fine sustained speed between Scorton and Oxheys, preceding the passage of Preston in 102¾ min. from the Carlisle start, or 13¼ min. under schedule. From there on to Crewe, though there was little opportunity for anything spectacular, Young continued with first-class work, speeds on the ascents to Euxton, Coppull, and Weaver Junction, and recovery from the various checks, being all notable.

On the next day after this, with the load increased to 430 tons and a furious westerly wind and rain, Driver Young had his work cut out, and the more so because, when the exposed length of level line was reached after Preston, *Launceston Castle* began to slip. From there right on past Lancaster and Carnforth, and on up to Grayrigg, Young had an anxious time, as he more than lost the gain in time he had achieved as far as Preston. But at Tebay, where any stop for banking assistance had been scorned, the engine got the mastery, and actually succeeded in regaining a little time up the steeper ascent to Shap. Once over the summit, all was plain sailing, and had it not been for a dead stand for signals outside Penrith, once again the train would have been early at Carlisle. From the point of view of times, this was perhaps the least interesting of the journeys, but from the standpoint of driving skill, it probably redounds more to the credit of Driver Young than any other that he made. Unfortunately, I am not in possession of the exact figures, but only of the facts just detailed. No difficulty was experienced on the following and concluding day in gaining time from Carlisle to Crewe with the 430-ton train, although I understand that the running was a shade less enterprising than that detailed in the second table, made a couple of days earlier. The Great Western authorities at Swindon have every reason to be proud, as they had in the exchange with the L.N.E.R. in 1925, of the superb work put up by their locomotive, and, in no less degree, of her brilliant handling by their capable representative.

And what of Midland compound No. 1047 on the Great Western line? As

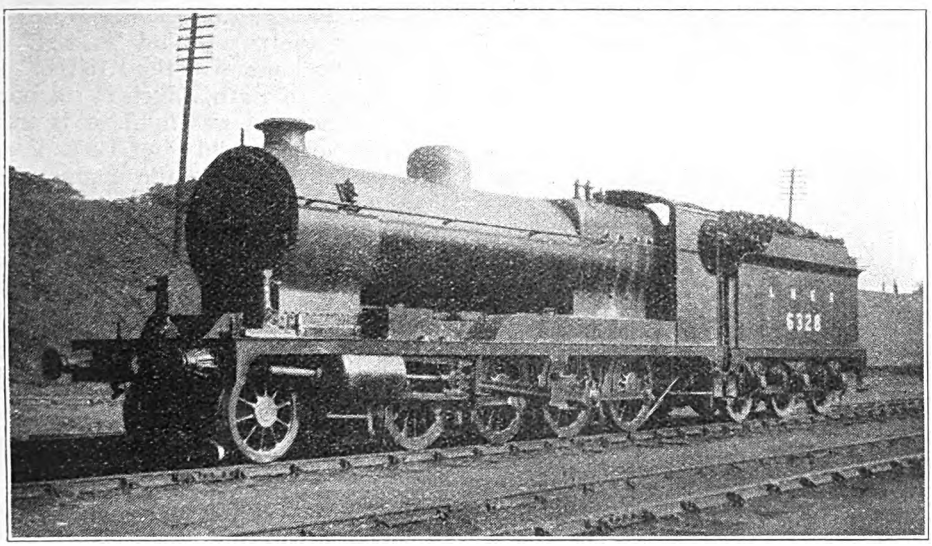

Photo.] [*R. D. Stephen.*

L.N.E.R. 2-8-0 LOCOMOTIVE (R.O.D. CLASS) AT DUNFERMLINE (UPPER).
Reconditioned at Darlington with altered chimney and dome.

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previously mentioned, it was not to be expected that a 4-4-0 engine of 60 tons' weight could handle the maximum duties usually allotted to 80-ton 4-6-0 engines, and no attempt was made to try the engine on such a train, for example, as the "Cornish Riviera Limited" express. She was, therefore, worked on more suitable turns, in order to compare her fuel consumption, as well as her running performance, with that of the G.W. engines usually employed on such turns; that is to say, the 2-cylinder 4-6-0's and the 4-4-0 "Counties." For this purpose No. 1047 was stationed at Bristol Shed, and worked in three successive weeks to and from Paddington, Plymouth and Birmingham respectively. To me it was a great disappointment that she was not tried on the London–Birmingham service, where a record of her work on some of the lighter 2-hour trains would have been of great interest. Throughout the trials she was worked by Driver Morris, of Kentish Town shed, and in this case also it would not have been possible for the engine to be better handled.

EXPERIMENTAL RUN,
PADDINGTON—BRISTOL, G.W.R.

Engine: L.M.S. 4-4-0 Midland 3-cylinder compound No. 1047. Driver: Morris.
Load: 24 axles; 198 tons tare; 210 tons full.

Distance.	——	Schd.	Actual.	Speeds.
Miles.		min.	min. sec.	m.p.h.
0·0	Paddington ..	0	0 00	—
1·3	Westbourne Park	—	3 05	—
4·3	Acton	—	7 00	52
5·7	Ealing ..	—	8 35	58½
7·3	Hanwell ..	—	10 15	60
9·1	Southall ..	11	12 00	59
10·9	Hayes ..	—	13 50	64½
13·2	West Drayton	—	15 55	66
14·7	Iver	—	17 20	67
16·2	Langley ..	—	18 40	68
		—	p.w.s.	25
18·5	Slough ..	20	21 55	—
22·5	Taplow ..	—	26 15	61½
24·3	Maidenhead ..	25½	28 00	64
31·0	Twyford ..	31½	34 05	68
34·1	Sonning Box..	—	36 50	70½
36·0	Reading ..	37	38 25	72½
38·6	Tilehurst ..	—	40 40	72½
41·5	Pangbourne ..	—	43 05	70½
44·8	Goring ..	—	45 50	71½
48·5	Cholsey ..	—	49 00	72½
51·5	Moreton Cutting	—	51 35	68
53·1	Didcot ..	53½	53 05	67
56·5	Steventon ..	57	56 10	65
60·4	Wantage Road	—	59 55	64½
63·9	Challow ..	—	63 10	64
66·5	Uffington ..	—	65 30	61
			sigs.	—
71·5	Shrivenham {	—	72 00	—
		—	74 00	—
76·3	Highworth Jc.	—	81 00	55½
77·3	Swindon ..	77	82 00	64
82·9	Wootton Bassett	—	87 15	69
87·7	Dauntsey ..	—	91 20	76½
94·0	Chippenham ..	93	96 40	66½
96·1	Thingley Jc. ..	—	98 40	62½
98·3	Corsham ..	—	100 50	62½
101·9	Box	—	103 50	80½
104·6	Bathampton	—	106 10	—
106·9	Bath	105	109 05	—

Unfortunately, I was not able to make more than one trip behind No. 1047, and that was the journey on the 1.15 p.m. from Paddington to Bath, which is set out in detail. The load was light, it is true—only 210 tons, all told—but I was greatly interested to see how the engine would shape in continuous high-speed steaming over a dead level track, so totally different to the conditions which obtain over the Midland main line, with its constant steep ups-and-downs. Any questions as to the engine's ability were soon set at rest by Driver Morris. We crossed the "sixty" line at Hanwell, had got to 68 at Langley, and should certainly have been doing 70 through Slough but for the unfortunate p.w. check past Dolphin Junction. As on the very faint rise to Twyford we were accelerating to 68 m.p.h., it is not too much to allow 2½ min. for the check, so that our net passing time to Reading was 36 min., or "even time" out of Paddington. Now we were travelling at 72½ m.p.h., and we kept over the "seventy" line as far as Cholsey, our average speed for the 14·4 miles from Sonning to Cholsey being 71 m.p.h. For all but 40 miles, from Maidenhead to Challow, we averaged 67·6 m.p.h.; speed gradually dropped up the rising grades from Didcot to Swindon, although it was still just above 60 m.p.h. at Uffington; but as Morris had more than won back to schedule at Didcot, there was no particular call for haste.

Then came the disastrous delay at Shrivenham, bringing us to a dead stand of 2 min., after a succession of preliminary signal checks. Despite the latter, and the Slough slowing, we had run the 71·5 miles in 72 min., start-to-stop, or

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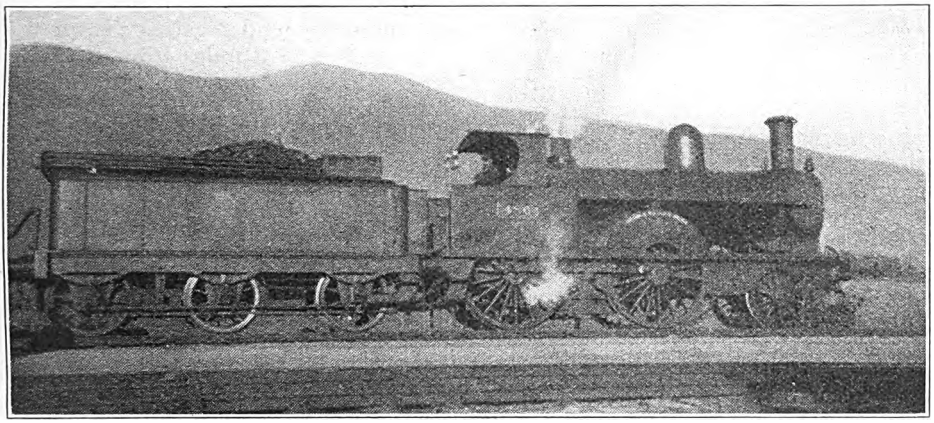

Photo.] [*W. B. Housman.*

L.M.S.R. (L.N.W. SECTION) 2-4-0 No. 486 "SKIDDAW," WITH MT. SKIDDAW IN BACKGROUND.

68½ min. net. When at last we got away, timekeeping to Bath was, of course, no longer possible, but Morris made a brilliant little run, covering the 35·4 miles in 35 min. 5 sec., start-to-stop—that is to say, to the stop of the slip-coach, in which I was travelling—or in less than "even time." This entailed a rapid acceleration, practically on the level, to 69 m.p.h. at Wootton Bassett, and maxima of 76½ m.p.h. on Dauntsey bank, and a momentary 80½ as we left the Box Tunnel. I thought that Dauntsey might possibly have produced a higher figure, and also that we might have mounted the 1 in 660 to Corsham at a slightly higher minimum than 62½, but these could barely be described as blemishes. So we reached Bath in an actual time of 5 sec. over 109 min., for the 106·9 miles, all delays included. But allowing 2½ min. for the Slough check, and assuming a time of

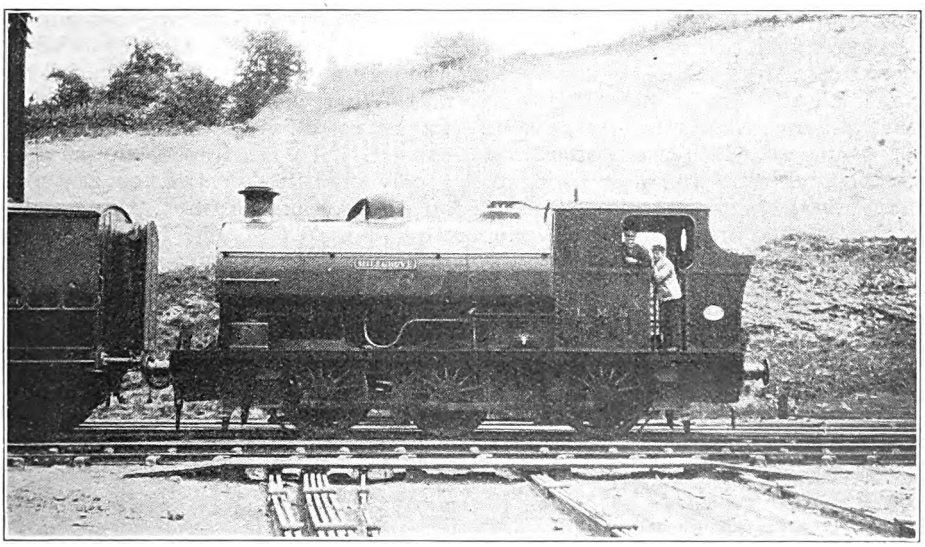

Photo.] [*W. H. Wright.*

L.M.S.R. 0-6-0T No. 11567.

Built 1913 for Cleator and Workington Railway and now taken over by L.M.S.R.

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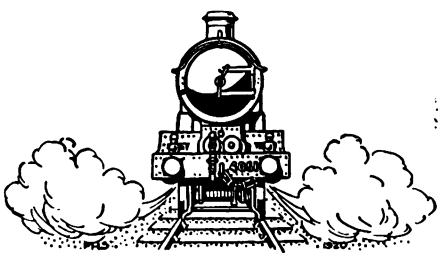
10 min. for the 10·8 miles from Challow to Swindon, instead of the actual 16½ min., Morris had achieved the excellent net time of 100 min. for the London to Bath run, equal to a gain of 5 min. on schedule time.

I am given to understand by a correspondent who was travelling in the main portion of the train that Bristol was reached only 1¾ min. late, the time from passing Bath slowly, in 108½ min. from London, being only 13¼ min. for the 11·3 miles to the dead stop, with the usual slow approach. This means that No. 1047's net time from Paddington to Bristol was 112¾ min., 7¼ min. under the two-hour schedule. In consideration of the size of the engine, this was a really first-class achievement, and it fully supports the contention so often advanced in these columns that for moderately-loaded high speed work the Midland compound, with its well-known economy in fuel, is an ideal engine, given proper handling.

Very little information has reached me as to the other trips made by the L.M.S. representative. On the Saturday of the London-Bristol week, when the weather conditions were as bad as they could be, with a hurricane blowing directly across this very exposed track, for the whole distance, and heavy rain, a ten-coach load of 323 tare tons, and 340-345 tons full, not unnaturally proved too much for No. 1047; even a "Castle" would very likely have failed to keep time in such circumstances. In fact, a "Saint" with 60 tons less lost 18½ min. from Bristol to Paddington on the 5.15 p.m. up the same day, 11½ min. of which was engine loss. The compound dropped time badly to Reading, reached in 50 min. 40 sec., where a stop had to be made for pilot assistance; and it is indicative of the strength of the wind that the "County" and the compound together required 91¾ min. for the 82·3 miles from Reading to Bristol, inclusive of a bad signal check at Keynsham. So the train reached Bristol half-an-hour late. It is generally understood that on all other trips the engine did quite well, and aroused considerable interest everywhere she went.

And now there is but one more locomotive exchange for which we wait. In the interests of British locomotive design, and the furtherance of our knowledge of locomotive performance, it is much to be hoped that the Great Western and the Southern authorities may see their way ere long to effect it. A "Castle" and a "Nelson," in an efficiency comparison, would, I believe, prove the closest "event" of the kind which has yet taken place in this country. As to whether or not it comes about, we can but "wait and see."

In pursuance of the promise given in my last article, I have pleasure in acknowledging the subsequent receipt, up to the time of final proof correction, of letters from Rev. J. H. Mortimer, Messrs. G. Andrews, R. N. Clements, H. Craven, R. J. Dallas, N. D. Ellis, A. G. Fitzgerald, H. J. J. Griffith, G. R. Grigs, F. R. Hebron, P. Hemming, C. A. Hunt, W. M. Larke, E. Little, C. E. L. Lucas, C. E. W. Neat, O. S. Nock, J. M. Scott, D. L. Smith, G. A. Wigham, J. Wrottesley and "Sir Hervis de Revel." Certain other communications are dealt with in the "Why and Wherefore" pages, and to some further correspondents I have replied personally. To all those who have been good enough to send their congratulations on the passing of my two hundredth "mile-post," I should like to take this opportunity of tendering my warm thanks.



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The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

VI.—QUEENSLAND GOVERNMENT RAILWAYS.

THE railways of Queensland have the distinction of comprising the biggest Australasian system in point of mileage. They comprise 6,114 miles of line on the 3 ft. 6 in. gauge, except for the 30 miles long Innisfail-Mourilyan Tramways, which are on the 2 ft. gauge. This transportation system serves a State having an area of 670,500 square miles, or 12 times the area of England and Wales. The population of the State numbers 850,000, so there is 1 mile of line to every 140 inhabitants.

From the outset Queensland adopted the principle of pushing railways inland from several different points on the coastline, principally Brisbane, Rockhampton, Townville and Cairns. This policy of decentralisation naturally created certain disadvantages to railway operation, inasmuch as the various systems were isolated from each other, and no interchange of rolling-stock could be effected without considerable expense and delay. More than 20 years ago the Southern and Central systems were linked up by a coastal connection between Brisbane and Rockhampton, but it was not until November, 1923, that connection was established between Rockhampton and Townsville. The last remaining gap in the North Coast system, viz., between Townsville and Cairns, was bridged in the early part of December, 1924. The coastal line connection between Brisbane and Cairns is 1,043 miles in length, while from Brisbane to Wallangarra, on the New South Wales border, is a further 223 miles.

A considerable proportion of the mileage of the Queensland Railways is situated at a long distance from the capital city. This fact, while it gives the Queensland railways the longest average haul of all the Australian lines, places them in a disadvantageous position from certain points of view. Queensland has practically 50 per cent. of the total connected line mileage beyond a radius of 500 miles from the capital city, whereas Western Australia has no more than 7·5 per cent. and New South Wales 2·6 per cent., while Victoria and South Australia have none.

Organisation and Administration.

The railways of Queensland are controlled and managed by a Commissioner, responsible to a Minister for Railways.

About five years ago the system of departmental management previously in force was changed to a decentralised scheme. General managers were appointed for the South-Eastern, South-Western, Central, and Northern divisions of the State, with headquarters at Brisbane, Toowoomba, Rockhampton and Townville respectively. Each of these general managers was given control of traffic, locomotive working and maintenance of the permanent way. A maintenance engineer, locomotive engineer and traffic superintendent were attached to each general manager's staff, without separate office staffs of their own, and considerable duplication of work inseparable from the "branch" system previously in vogue was eliminated. The general manager in each division was assisted in the management at outlying centres by assistant general managers or superintendents of transportation.

The officers responsible for the working of the traffic, engineering, locomotive and financial sections are brought together at committee meetings held monthly, at which statistics relating to their respective spheres of work are discussed from every angle, in addition to which any matters of importance demanding special discussion are considered. The recommendations of these officers come before the Commissioner's committee meeting held at a later date in the month. This committee is presided over by the Commissioner and includes the general managers, chief engineer, locomotive works manager, chief accountant and the secretary.

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The Queensland Government Railways, on June 30, 1924, employed 16,940 persons, the total amount paid in salaries and wages being £3,859,913.

PERMANENT WAY AND WORKS.

The present standard track for main lines consists of 1,100 yards of ballast to the mile, laid upon a formation 14 ft. wide and 2,640 sleepers to the mile. Sleepers are wood, 7 ft. long by 9 in. by 5 in., and are chiefly round-backed, *i.e.*, the tops are not sawn, but original sap-wood and the rounded form of log is retained, it being found that this extends the life of the sleeper. The rails are connected with angle fishplates and are spiked direct to sleepers.

The increase in traffic has necessitated improvement in gradients and curvature in many portions of the State, and the relaying of a considerable mileage with 60-lb. rails in place of the 41¼-lb. section. In the busier areas around Brisbane several miles of heavier 75–80-lb. section of rails have also been laid. This improvement of track has naturally led to the strengthening of bridges. Timber bridges previously designed for 8-ton axle loads have been strengthened up to 12-ton axle loads; steel bridges designed for 8-ton axle loads are also being strengthened, chiefly on the North Coast Railway from Brisbane to Rockhampton, and on the main Western line from Brisbane to Roma. In the case of steel bridges the policy is to look further ahead as regards the weight of rolling-stock, and all large steel structures are being strengthened to 15-ton axle loads upon drivers of engines of the 4-8-2 type, which will be equivalent to practically 18 tons upon the drivers of engines of the 4-6-0 type. Minor steel structures, although immediately being strengthened only to 12-ton axle loads, are so designed that the insertion of a third member will bring them up to 15-ton axle load.

Of the total line mileage, there are only 129 miles of duplicated track, almost all of this being in the vicinity of the capital. There are in addition 92½ miles of crossing loops and 471½ miles of sidings. All new crossing loops must be at least 17 chains long between points of clearance.

FLYING GANG MAINTENANCE.

On some of the lines where the traffic is comparatively light permanent way maintenance is a heavy item of expense. A notable illustration is the Concurry District, in North-West Queensland, and there an experiment, which has proved successful, has been tried in connection with the system of maintenance. Where previously 25 fixed gangs, comprising 75 men, attended to 235 miles of permanent way, there are now six gangs with a strength of 38 men. The camps are located where schools, water supply and telephonic facilities are available, and a rail motor car, capable of hauling a trailer, is supplied to each gang to facilitate movement and conserve the energy of the men for actual fettling work. It is anticipated that a saving of approximately £10,000 per annum will be achieved, while greater domestic comfort and improved educational facilities will be afforded. This principle is being extended to other districts.

SIGNALLING.

The ordinary staff and ticket system in conjunction with signal protection is the basis of train control on all the Queensland lines. In October, 1904, the electro-pneumatic system of interlocking was brought into operation at the Brisbane Central Station, this being the first installation of its kind in Australasia. As traffic has developed the electric staff has been introduced for single-line working. On double line the single-wire block system obtains, but lately this has given place to the automatic system.

Automatic signalling has been installed between Roma Street Station, Brisbane, and Sherwood Station, on the main Southern line, a distance of 6¼ miles, the up advance starting signal at Roma Street being the entrance to the automatic section on the up main line, the down advance starting signal at Sherwood fulfilling a similar function on the down main line. There are, altogether, 29 automatic signals in the area, 15 on the up road and 14 on the down road, all of which have square-ended arms painted red with white bars.

Owing to the sparsely populated country through which the 6,000 odd miles of the Queensland Railways run, it has been necessary to provide interlocking only on the lines of heavy goods and passenger traffic. The total number of miles of double line operated under block regula-

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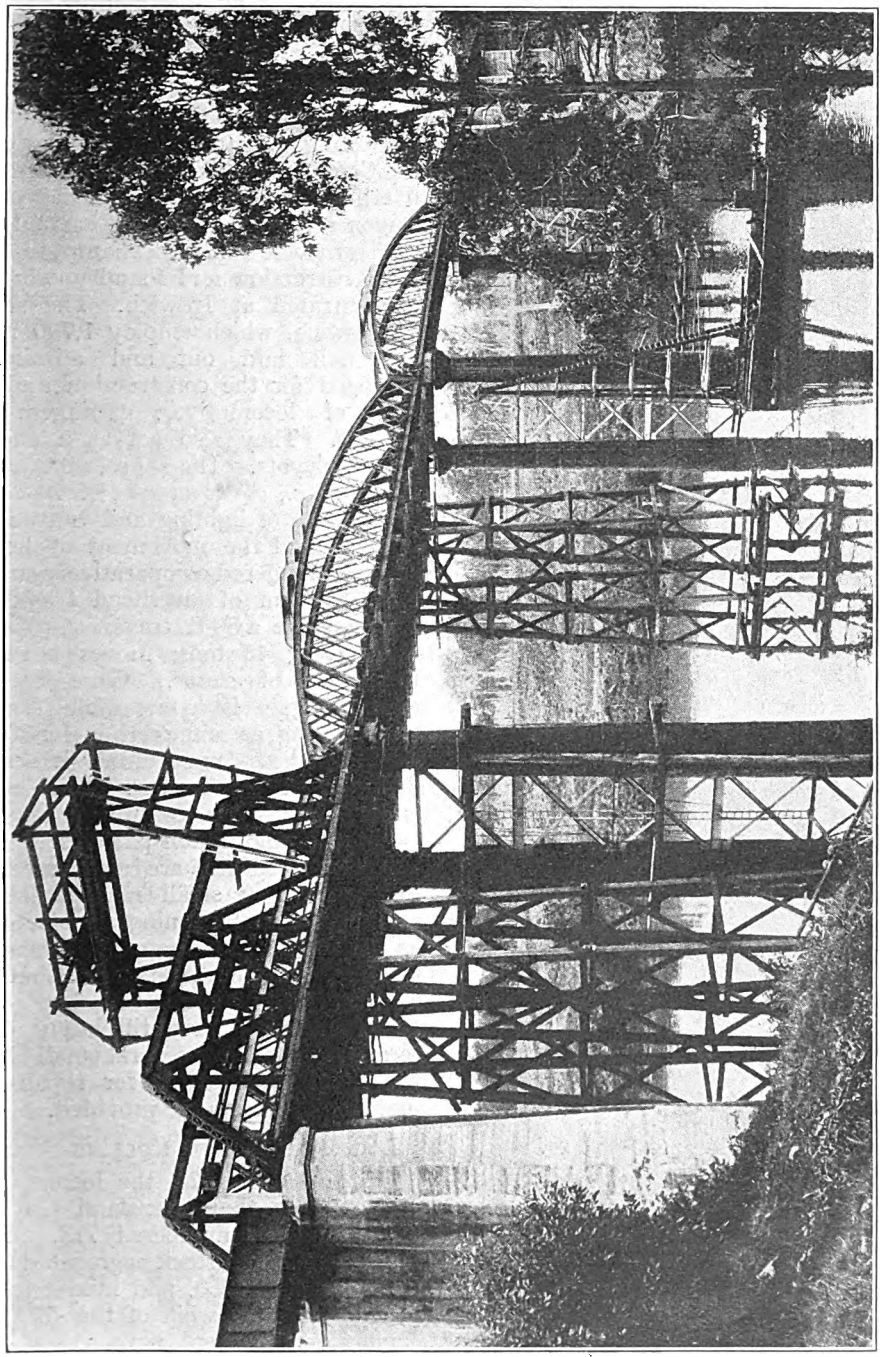

REBUILDING STEEL GIRDERS ON ANTIQUA BRIDGE OVER MARY RIVER, NORTH COAST RAILWAY. (THE TWO CENTRAL SPANS ARE 150 FT. LONG.)

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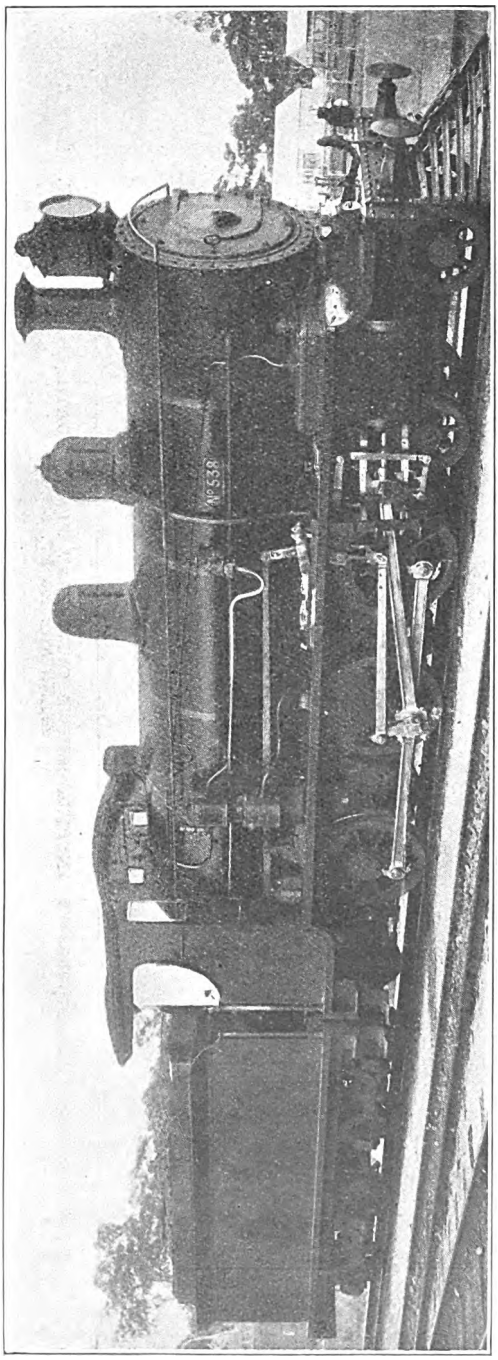
tions is 140, whilst 354 miles are worked under electric train staff. All the important junctions have been equipped with interlocking, together with the crossing stations on the more important lines. It is intended to instal the electro-pneumatic system at Ipswich new station and Roma Street and Mayne new depots, all now under construction.



4-6-0 TYPE MAIN LINE PASSENGER LOCOMOTIVE.

Locomotive Workshops.

The principal locomotive workshops are situated at Ipswich, 25 miles from Brisbane, and during my recent tour in Queensland I had the pleasure of inspecting them in the company of the Commissioner. General locomotive overhauls, together with carriage and wagon repairs, can also be carried out at Townsville and Rockhampton, but all construction and foundry work is concentrated at Ipswich. The shops at Ipswich, which employ 1,700 men, are well laid out and admirably arranged for the construction and repair of locomotives, carriages and wagons. They also act as a supply for out-depots. The shops, offices and sidings, &c., cover an area of 70 acres. The system of lighting and ventilation is good, and the movement of heavy material rendered comparatively simple by a system of overhead travelling cranes, while a 50-ft. traverser, capable of carrying 45 tons, moves between the rows of shops. Close to the entrance gate is a fine dining room, with seating accommodation for 1,000 men. A three-course dinner is served daily at a small cost. The room is managed by a committee of the employees, and is well patronised.

Repair facilities are also provided in the form of small machine shops at the principal running depots, such as Brisbane, Toowoomba, Warwick, Gympie, Maryborough and Charters Towers. At Cairns, Mackay and Innisfail, which have till lately been terminal depots for several small lines, the necessary facilities for repairs to meet requirements are provided.

Locomotives and Rolling-stock.

On June 30, 1924, the locomotives employed on the Queensland Government Railways numbered 713. Passenger engines in stock aggregated 319, freight engines 250, and mixed traffic locomotives 92; while of the 52 tank engines, seven were for use on the 2-ft. gauge Innisfail Tramway.

During the past decade there has been a marked advance in the type of locomo-

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tive in use, by the introduction of superheating and the building of many engines of the 4-8-0 type—C 17 and C 19 class. The C 19 class is the heaviest engine so far placed in traffic, its leading dimensions being :—

Cylinders	19 in. dia. × 23-in. stroke.
Piston valves	8 in. dia.
Coupled wheels	4 ft. dia.
Bogie wheels	2 ft. 4 in. dia.
Pressure	160 lb.
Tractive force at 78 per cent.	21,735 lb.
Weight on coupled wheels	40·66 tons.
Adhesive factor	4·19
Weight in service ..	93·65 tons.
Water	3,500 gallons.
Coal	7 tons.
Wheelbase (fixed) ..	12 ft. 6 in.
Heating surface—	
122 tubes, 1¾ in dia. / 21 tubes, 5 in. dia.	896·0 sq. ft.
Firebox	147·25 ,,
Superheater elements ..	225·0 ,,
	1,268·25 sq. ft.

To meet the increasing demands of the extending suburban service of the rapidly growing City of Brisbane, 10 tank engines of an improved type have recently been placed in commission. These engines are of the 4-6-4 type, and the boiler is equipped with a "Robinson" 16-element superheater and inside admission piston valves. These engines are giving excellent results in service, and a further batch of ten is under construction at the Ipswich workshops.

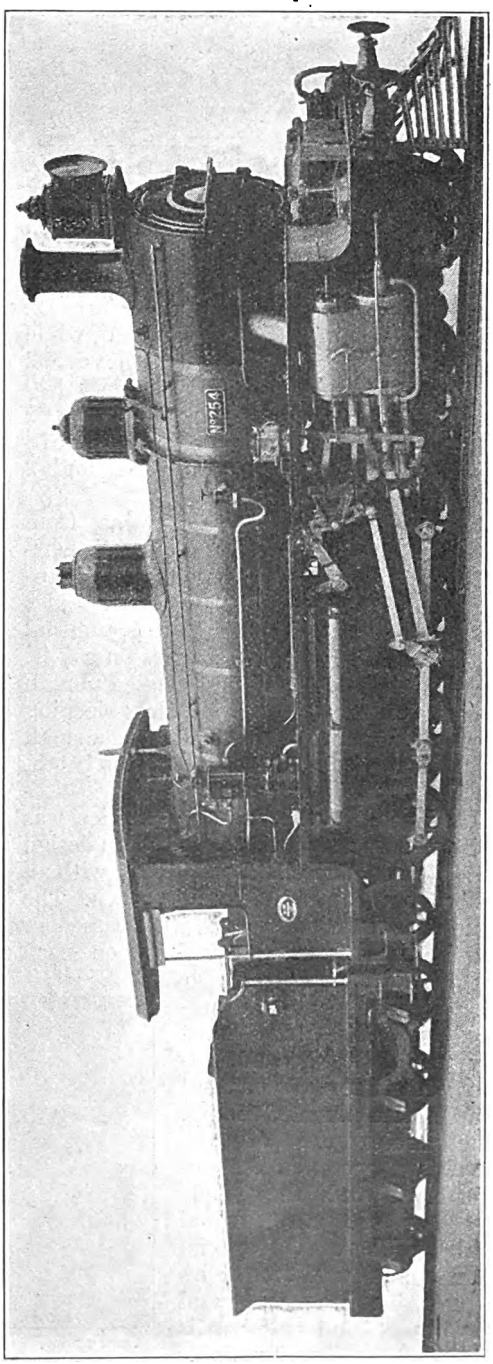
The C 19 and C 17 type are the principal main-line engines in use, whilst the PB 15 (4-6-0) class is the general type for mixed traffic on light lines. A rack engine is used on the Mount Morgan section.

With regard to future developments, a 4-6-2 (wide firebox) type of passenger locomotive is under consideration, and the construction of 30 of a modernised type of "PB 15" engines for use on branch lines is in hand. These engines, in common with practically all others in service, are of a mixed traffic class, being used on both passenger and goods service. The maximum diameter of driving wheels of the locomotive is 4 ft. 3 in., and the maximum axle load 12 tons.

Queensland was the first State in the Commonwealth to adopt petrol-driven rail motor-cars, some of which have been in service for 12 years, but they are being replaced by steam cars, two of which are now running.

Coaching Stock.

The coaching stock in service on June 30,



4-8-0 TYPE MIXED TRAFFIC LOCOMOTIVE.

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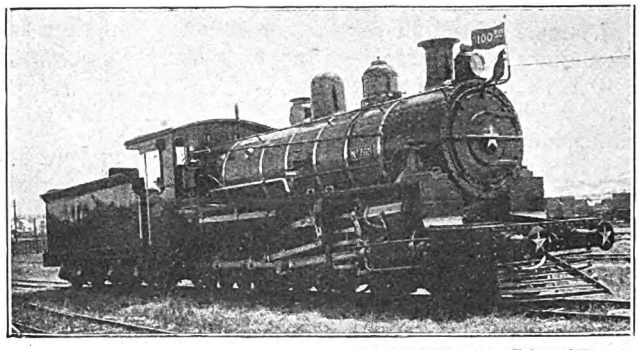


THE 100TH ENGINE (C. 19 CLASS) BUILT AT IPSWICH.

1924, numbered 1,073 vehicles, of which 1,035 were passenger cars. In the composite cars, of which there are 151, and in the special cars, of which there are 12, sleeping accommodation is provided, while the 30 first-class sleeping cars have 592 berths and the 18 second-class cars 540 berths. The coaching stock includes 169 first-class cars, 305 composite cars, 318 second-class cars, 13 postal vans, and 2 kitchen cars.

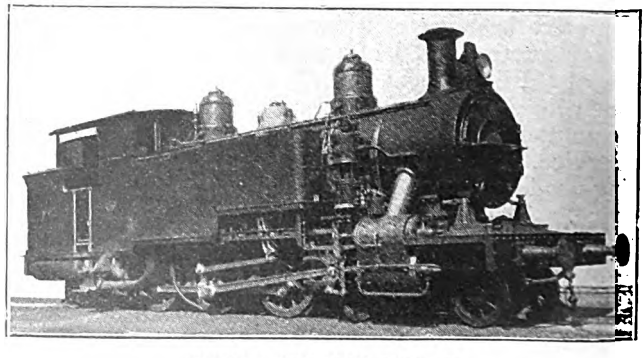
The two principal mail trains from Brisbane are the Northern Mail to Townsville and the Southern Express to Wallangarra (for Sydney and New South Wales stations). The Northern Mail is unusual in that it has 9-ft. wide coaches on a 3-ft. 6-in. gauge, and the first-class Pullman sleeping cars provide second-class sleeping accommodation. In the latter case a small charge is made for the use of a rattan berth, no bedding being supplied.

During 1923 the Southern service was improved by new trains of a modern design suitable for Queensland conditions, with an observation car as the trailing coach. The train is of the corridor type with passenger communication gangways between each coach, and is equipped with electric light and Westinghouse brake. The observation car is finished internally with fumed Queensland maple, with panelled ceiling. The chairs are of the revolving type, leather upholstered, and the whole floor of the car covered with rubber. A special lounge is provided for ladies — ensuring privacy — and the observation platform is equipped with adjustable sun-blinds and folding chairs. Electric light and fans are installed, together with an emergency air brake in the car and a hand brake on the platform. No provision is made for smokers in the car, a portion of the adjoining carriage across the gangway being fitted for smokers only. Emergency breakdown equipment is carried on the observation car, of which an illustration appears elsewhere.

The standard suburban car is of the cross-seat type. These have been adopted for a considerable time, as they enable shorter stops to be made at stations. Suburban trains are assembled on the "block train" principle and are electrically lighted throughout on Stone's system. Steel underframes for carriages are now the adopted practice. Gas lighting for carriages is in use to a certain extent, but for some considerable time the policy has been to instal Stone's electric lighting system.

Wagon Stock.

There are some sixty different types of wagons in use on the railways of Queensland, the total goods stock amounting to 12,652 units, the total tonnage capacity being 121,302 tons. Live-stock conveyance bulks largely in Queensland traffic and 1,511 vehicles are provided, there being 931 cattle wagons and 472 sheep wagons. In the service stock of 1,472 vehicles there are 1,008 ballast and 312 water trucks. The Westinghouse brake is standard throughout, every vehicle being fitted; the drawgear is continuous and side buffer and screw couplings universal. The eight-



SUBURBAN TANK ENGINE.

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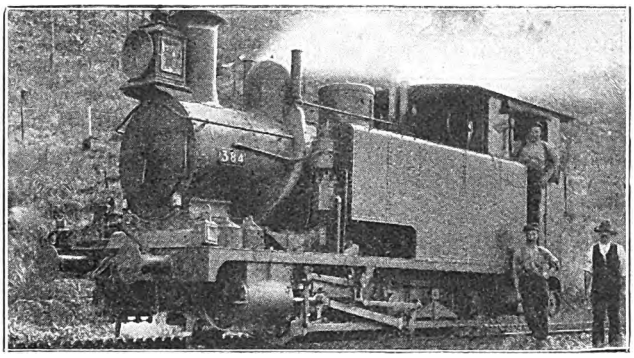
wheel stock is of the four-wheel bar frame bogie type, but the four-wheeled stock is generally on the Grover's bogie system, which is in extensive use on many classes.

The question of steel underframes for future wagon stock is under consideration. Except in isolated cases amongst wagons, wood is the medium of construction in bodies, the local timbers being drawn upon without necessity for importation. For underframes and bottom sides and wagon work generally, ironbark, spotted and blue gum, blackbutt, &c., give excellent service, whilst in the softer woods, yellow wood for pillars, cedar, silky oak, and maple for interior work, and pine for roof and partitions, are standard. Such woods as cedar, silky oak, and maple lend themselves wonderfully for decorative treatment, and the whole interior of the latest mail trains is so finished throughout.

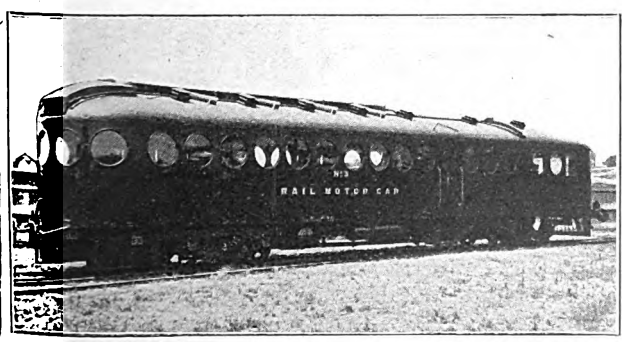


RACK LOCOMOTIVE BUILT BY DUBS & CO., GLASGOW

Passenger and Goods Traffic.

The general direction of traffic in Queensland is from the west to the seaboard. As the western country is mostly pastoral the main traffic there is wool and live-stock. In the more settled districts of the coast, agricultural produce and timber constitute the main traffic. In the mineral districts, which are situated at varying distances, a fairly heavy mineral traffic is carried. The principal products carried are wool, cattle, sheep, pigs, butter, cheese, fresh fruit, log and sawn timber, sugar cane and sugar, wheat, maize, cotton and many other agricultural products, as well as large quantities of coal, copper ore, gold and other minerals. A feature of the business, which militates against economical operation, is the large amount of "one-way" traffic, necessitating the haulage of empty wagons one way. The position is accentuated by the lack of alternative routes, the long dead-end railways necessitating a great amount of unproductive haulage.

The principal passenger station in Brisbane is the Central Station, and during the year 1923–24 1,483,377 passengers were booked there. The station is situated in Ann Street, Brisbane, and has a frontage of 522 ft. to that street. The central portion is of classic design, of elegant proportion and handsome appearance. A massive Doric portico is carried over the footpath and marks the main entrance to the booking hall and subway. Four arched openings form the entrance to the large booking hall, and to these are fitted handsome wrought-iron gates. The clock tower in the centre of the building rises to a height of 100 ft. above the footpath, and fitted therein is a fine clock with 6-ft. diameter dials, electrically lighted. The buildings of the intermediate and end wings are of red pressed brick and pink and white Helidon stone facings, and are designed to harmonise with the central portion. The main roof over the platforms and lines is framed of steel and covers an area of 26,000 super ft., is elliptical in form, the first of its kind in Australia, and has a clear width at



McKEEN RAIL MOTOR-CAR.

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platform level of 100 ft. with a central rise of 42 ft.

The principal freight depot is that at Roma Street, Brisbane, and is situated within the city. It has combined passenger and goods traffic and contains locomotive and car depots. The outwards goods traffic from Roma Street is more than 200,000 tons yearly and the inwards about 300,000 tons, the number of passengers booked annually being approximately 300,000.

This station was for 14 years the terminus of the Queensland Railways in Brisbane (1875 to 1889) and the first headquarters of the railway staff, whose offices were then concentrated in the station buildings. In 1889 the railway line was continued through the city of Brisbane and connected by a loop of some 2½ miles with Mayne Junction, a station on the old system which ran out of Roma Street Station to the seaside resort of Sandgate, thus making the Roma Street Station a roadside one for passenger service.

Improved Facilities at Roma Street.

Increased traffic requirements have necessitated the rearrangement and extension of this station, and, as I saw on the occasion of my visit early in 1925, work is in hand to meet these requirements by the construction of an enlarged passenger station of modern type. The station will have four through main roads together with five dock platforms each 600 ft. long, and with eleven lines of rails laid between them. An up-to-date station building with suitable booking and assembly accommodation and the necessary offices will be provided, together with facilities for the mechanical handling of luggage. This building will be several storeys high and will accommodate under one roof all the executive offices of the railway department, which at present are scattered over various parts of the city. The new passenger station will occupy the position of the present passenger station and also the present goods depot, and contain over 2 miles of track. To accommodate the goods traffic a large amount of excavation has been carried out on the north side of the station, and about 1,000,000 yards of earth removed. The output from this excavation has been made use of in the reclamation of land at what is known as Mayne Junction, about 3 miles from the city.

The goods depot is being laid out for gravity shunting and will contain big sheds for the handling of country produce and both inwards and outwards goods. The goods sheds will be equipped with underhung jib cranes traversing the length of the shed, and electrically operated capstans. A large amount of direct handling from truck to cart and from cart to truck is carried out, and to meet this a very considerable length of sidings is being laid in. Electric gantries will also be provided for the heavy bulk loading. In all, the depot will contain over 10 miles of track. The alterations are being carried out gradually, and on the occasion of my visit one produce shed 560 ft. long and covering three lines of rails had been erected, and was in operation, while an enclosed goods shed 560 ft. long was in course of erection.

At Mayne a large area of land has been filled up, partly from the excavation carried out at Roma Street goods depot and partly from excavation in its own locality. Two large engine sheds are in course of erection. A 200,000-gallon water storage tank of reinforced concrete has been constructed for locomotive requirements, and an elevated coal bin is also in process of erection, with ashpits and appliances for handling ashes. The depot is being provided with large carriage sheds, wagon shop and other necessary shops.

Live-Stock and Fruit Traffic.

The Queensland Railways are noted amongst cattlemen for the handling of live-stock traffic expeditiously and with a minimum of loss. A feature of the business is the long haulage of live-stock. Large numbers of cattle have been trucked recently from Dajarra (in North-West Queensland) to the Brisbane area, a distance of considerably over 1,400 miles, with very few losses. The trucks, which are without roofs, each carry 17 or 18 head. On journeys such as the above mentioned the cattle are detrained at one or two places en route and spelled for a day or two before re-loading. For several months in 1923 three train loads of cattle per day were trucked from Quilpie (in South-Western Queensland) to Wallangarra, the junction station of New South Wales, a distance of 643 miles, and there tran-

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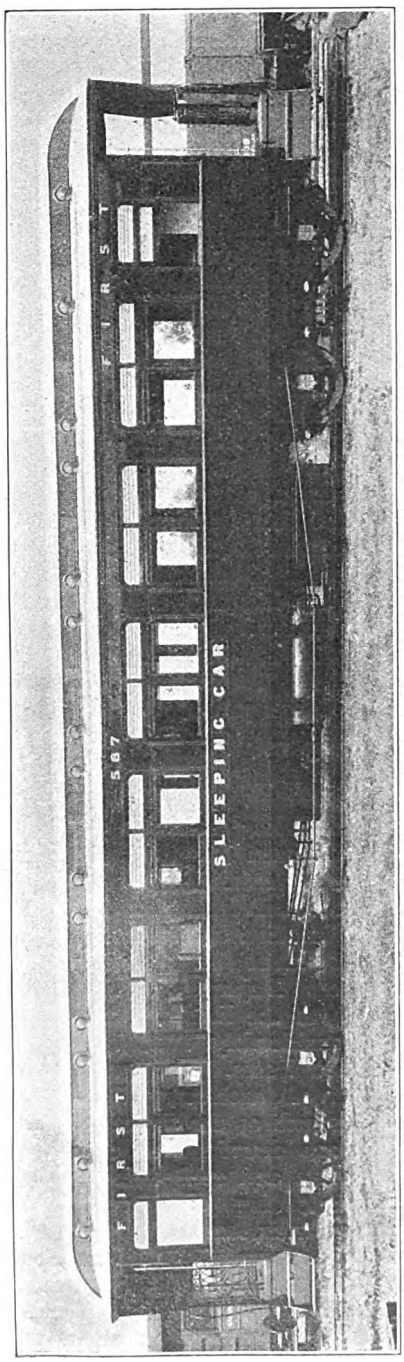
shipped into trucks for Sydney, 492 miles further on. After their journey of 1,135 miles by rail, these animals (fed solely upon the natural grasses of Western Queensland) frequently topped the fat-stock market in Sydney.



FIRST-CLASS SLEEPING CAR, QUEENSLAND RAILWAYS.

During the past few years a large traffic has been developed between the fruit-growing districts of Queensland and the Southern capitals. Special trains run every week from the banana and pine-apple areas between Brisbane and Gympie to Sydney and Melbourne, about 1,000 tons of fruit being sent out of the State weekly. Special transit is given to these trains in Queensland, New South Wales and Victoria, and the fruit arrives at its destination in good condition, meeting with a ready market at prices satisfactory to both grower and consumer. In the season special trains loaded almost exclusively with tomatoes are run weekly from Bowen (in North Queensland) to the Southern border, a distance of 936 miles, there to be transhipped into New South Wales trucks for conveyance to Sydney and Melbourne, an additional 492 miles and 1,082 miles respectively.

General.

As a general rule meals for passengers are provided at wayside refreshment rooms, but on the main Western Railways dining cars are attached to the principal passenger trains. A course meal is provided at a cost of 2s. 6d., and we can personally vouch for its high standard. In addition, morning and afternoon teas and light refreshments are served. On the Southern mail train, running between Brisbane and the New South Wales border, iced drinks, fruit, sweets, tobacco, cigarettes, &c., are obtainable, passengers refreshing themselves further, if they so desire, at the refreshment rooms at Ipswich, Helidon, Toowoomba or Warwick.

For a number of years the advertising on the Queensland Railways was under the control of another Government Department, but in 1922 it was placed under the control of the Commissioner for Railways. An important innovation, which has been introduced during the last two years, is the development of advertising in carriages and on the sides of covered goods wagons, the result being very gratifying. For an eight-wheeled box wagon the charge is £50 per annum, and for a four-wheeler £33 per annum, the contract being for a minimum period of three years. If more than one wagon is used by an advertiser the rate is slightly reduced.

The Queensland Railway authorities

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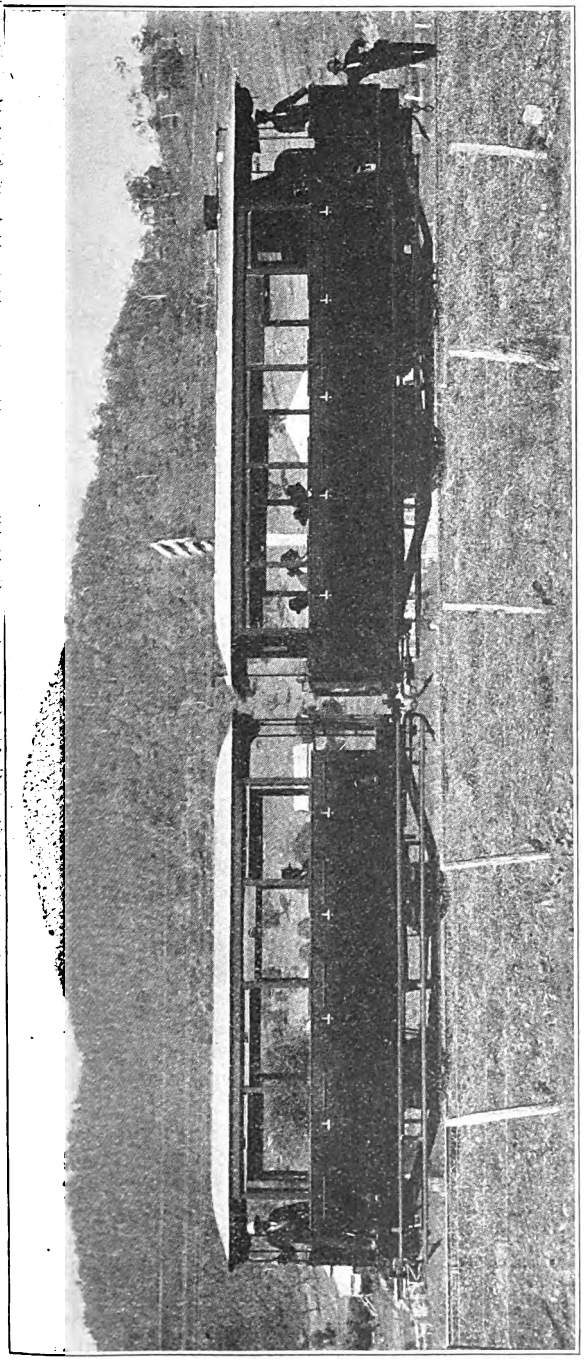
	100 Miles.		300 Miles.		500 Miles.	
	1st.	2nd	1st.	2nd.	1st.	2nd.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Ordinary return	36 6	23 8	98 10	61 10	152 8	92 6
„ excursion	27 5	17 9	74 2	46 3	113 11	68 10
New return fare (*see text*) ..	13 8	8 10	28 2	18 10	37 11	25 5



STEAM RAIL CAR AND TRAILER, QUEENSLAND RAILWAYS.

give every encouragement to the staff to qualify in ambulance work. For the past four years in succession Queensland has been successful in winning the Interstate Ambulance Shield against teams from all other State systems and the Commonwealth Railways, thus illustrating the high standard of efficiency attained.

With regard to fares, very large concessions were recently offered to women and childen residing at a distance of 100 miles or more west of the nearest coastal town, and they are now able to visit the coast once in each year at exceptionally low fares. The above table shows the extent of this concession. It will be seen that a woman can thus travel 1,000 miles for 25s. 5d., or a little more than ¼d. per mile. These are probably the cheapest passenger fares on any railway in the world.

Very cheap rates are also quoted in connection with fruit traffic in Queensland. Interstate fruit traffic has grown to large dimensions, and during the last financial year, no less than 45,000 tons of fruit was forwarded to other states. The distance the fruit is hauled in Queensland alone ranges from 250 to 1,210 miles, and as showing the cheapness of the rates it may be noted that the freight on bananas from Palmwoods to Sydney (777 miles) amounts to only about one penny per dozen, while the freight on tomatoes from Bowen to Sydney (1,432 miles) represents approximately one half-penny per lb.

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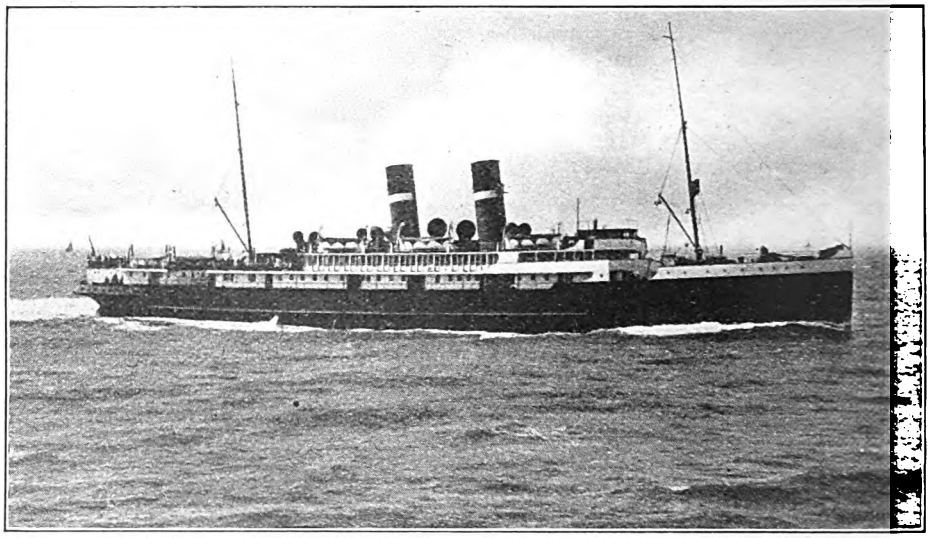

ZEELAND SHIPPING COMPANY'S STEAMER, FLUSHING CONTINENTAL SERVICE.

The Flushing Steamer Service.

By G. A. SEKON.

THE present generation has regarded the Flushing service as essentially connected with the late S.E. & C.R., but in reality it owes its initiation chiefly to the fierce competition between the London, Chatham & Dover and South Eastern Railways of fifty years or so ago. This competition was, in some respects, a trial of wits between the great protagonists, John Staats Forbes, Chairman and (in effect) General Manager* of the L.C. & D.R., and Edward Watkin, Chairman of the S.E.R. Forbes won, probably because of his railway and family connections with Holland.†

So it came about that in 1874, when Prince Hendrik of the Netherlands, the Dutch Government and the Dutch State Railways were proposing to establish a steamer service to England in competition with the Belgian State service from Ostend, Forbes had early information of the project, and was enabled to enter into negotiations on behalf of the L.C. & D.R. before Watkin was cognisant of the project. The obvious English port for the service was Ramsgate, about 95 miles from Vlissingen (Flushing), the Dutch port chosen for the service. But an agreement was in existence between the S.E. and L.C. & D. Railways under which receipts from all Continental services operated from any place between Margate and Hastings, both inclusive—the extreme harbour towns of the two railways—were to be divisible between the two companies. Forbes therefore looked around to see how he could circumvent this arrangement. This he was able to do by fixing on Queenborough, a free port under an ancient charter, situate at the mouth of the Medway, and therefore outside the limits of the Continental agreement.

Queenborough was served by the Sittingbourne & Sheerness Railway, a line then already leased to the L.C. & D.R. Watkin was furious when the arrangements for a L.C. & D.R. Continental service, in the proceeds of which the S.E.R. would not participate, were disclosed, and began

* The Chief Officer of the L.C. & D.R. was designated Assistant Manager only. Forbes held the reins but did not assume the title of General Manager.

† Prior to being appointed Chief of the L.C. & D.R. Forbes had been Resident Director in Holland and General Manager of the Dutch Rhenish Railway.

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to lay plans to meet the new competition; but it was not until 1879 that the line by which the Queenborough service was to be countered was sanctioned, and a year later before the extension of this line to the Medway opposite Sheerness was authorised and its design became obvious to Forbes. This branch railway was opened in 1882, and although much talk of a competing service between Port Victoria and a Dutch port was indulged in from time to time, the threatened S.E.R. competition never materialised. Port Victoria was, in fact, utilised only to enable the S.E.R. to obtain a share of the Sheerness traffic by means of a ferry service across the Medway.

The Flushing service was inaugurated on July 26, 1875, a boat carrying passengers sailing each evening in each direction daily, except on Sundays. Queenborough pier was not then completed, so the steamers ran to and from Sheerness. The fleet consisted of three paddle boats of the following dimensions:—

Length	295 ft.
Width over paddle boxes ..	60 ft.
Gross tonnage	1,600.
Developed horse-power ..	1,200.
Speed	13 knots.

Cabins were provided with 150 berths in the first class, whilst 50 passengers were accommodated in the second class. After a trial of less than four months the service was withdrawn on November 14, 1875. Of the three original steamers—*Stad Middelburg, Stad Vlissingen,* and *Stad Breda*—two had been employed as blockade runners during the American Civil War.

Queenborough Pier having been at length completed, the service was reopened on May 15, 1876; cargo was carried in addition to passengers, whilst a few months later the mails from Holland to England were transferred to the route, the Dutch Government guaranteeing payment of fl. 151,000 per annum for the services rendered.

The steamers left Flushing at 9 p.m., the sea passage of about 111 miles occupying nine hours. The boat train was due in London at 7.55 a.m.

More capital was obtained from Prince Hendrik, and two new paddle boats were ordered in Glasgow, which were put into service in March and April, 1878. They had a speed of 16 knots and were of 1,700 gross tonnage and 3,500 h.p. For many years these two vessels and their successors represented the high-water mark of paddle-boat speed and comfort. The three old boats were withdrawn and the new ships—*Prinses Marie* and *Prinses Elizabeth*—performed the service, no third or reserve boat being available till 1880, when the *Prins Hendrik,* of similar dimensions, was added. In the same year new connecting railways in Holland enabled trains to be run between Berlin and Flushing, so that the service became of more importance. During 1880 the average number of passengers carried per voyage was 96; whilst 35,000 tons of cargo was also transported during the twelve months. On May 18, 1882, Queenborough Pier was burnt to the water's edge, and the boats thereafter sailed to and from Dover. Sufficient repairs were effected, however, to enable the passenger service to make use again of Queenborough from June 18, the goods traffic being conveyed to and from London and Flushing by steamers chartered for the purpose.

In 1883 a fourth paddle-wheel vessel was built for the service and named *Willem, Prins van Orange,* with general dimensions about the same as the others, but with engines of 4,000 h.p., giving a speed of 17 knots.

So much time elapsed before Queenborough Pier was again in a condition to deal with cargo that it is surprising the S.E.R. had not persuaded the Zeeland Steamship Company to transfer its services to Port Victoria. However, in 1885 the goods traffic was again handled at the Sheppey Pier, and in that year a new agreement was entered into between the L.C. & D.R., Netherlands State Railways and the Zeeland Steamship Company. It was then decided, on the instigation of Continental postal authorities, to run a day service, in addition to the night boats, and the Zeeland Company raised new capital with which three paddle boats having the same general dimensions as the *Willem, Prins van Orange,* but fitted for day service, were built on the Clyde. They were named *Engeland, Nederland,* and *Duitschland.* The day service was inaugurated on June 1, 1887. It was

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popular from the Continent, but the departure from London was fixed at too early an hour to attract traffic.

The improvement of the G.E.R.'s Hook of Holland service in 1893 affected adversely the Flushing route. To regain its traffic the Zeeland Company reduced its fares and had three new paddle steamers built for the night service, which were larger and more powerful than the existing boats. They were named *Koningin Regentes*, *Koningin Wilhelmina*, and *Prins Hendrik*. The speed was 20 knots, gross tonnage 2,000, and 9,000 h.p. They were put into service in the autumn of 1895; the higher speed of these steamers enabled the departure from London to be at a later time.

The then recently concluded working arrangement between the S.E. and L.C. & D. Railways proved advantageous to the Flushing route when, in 1900, the Queenborough Pier was burnt down for the second time, the services being run to and from Port Victoria, with the added benefit of a shorter rail journey, although the working to and from Victoria was complicated by the reversal at Blackfriars.

After 35 years' experience of paddle-wheel steamers the Zeeland Company provided three twin-screw steamers for its night service. They were built at Glasgow and were 22½-knot boats, of 3,000 tons gross and 10,000 h.p. each. The twin-screw vessels were named *Prinses Juliana*, *Oranje Nassau*, and *Mecklenburg*. Put into service in April, 1910, the new swift vessels attracted many more passengers; for the year 1912 the number of travellers by the route was 159,000 compared with 128,000 for 1909.

Acceleration of the Hook of Holland service in 1911 made it necessary to quicken the competing Flushing night service; this was difficult with Queenborough as the English port which is 111 miles distant from Flushing. An English port nearer Flushing was sought. Ramsgate is the nearest but suitable facilities were lacking there, and eventually Folkestone was decided upon. As Folkestone is a longer railway journey from London than Queenborough it was assumed by some that the sea passage to Flushing must also be longer. This, however, is not the case, it being in fact 19 miles shorter. With Dover as the British port another 7 miles would have been saved, but the S.E. & C.R. has not control of the harbour and pier at Dover as it has at Folkestone.

The change to Folkestone was made in the summer of 1911, the day steamers continuing to run to and from Queenborough, the three 1895 boats being reconditioned as day boats for the service. During the war two of the twin-screw and two of the paddle-wheel steamers were destroyed by running on mines, and to provide for the post-war service two new twin-screw steamers were built in Holland.

The *Prinses Juliana*, the first of the new ships, taking the name of one of the boats lost in the war, was put into service at the end of August, 1920, and the second, the *Mecklenburg*, in the summer of 1921. The leading dimensions of these vessels are:—

Length	364 ft.
Breadth	45·4 ft.
Depth	25·1 ft.
Speed	22·6 knots.
Horse-power	10,000.
Gross tonnage	3,000.

Accommodation for 800 passengers.

The services were suspended during the war and when re-commenced the day boats to and from Queenborough were not reinstated. In June, 1922, however, it was considered desirable to reinstate the day service to and from Flushing. The G.E.R. had its Harwich–Hook of Holland night service, and it was suggested that the Zeeland Steamship Company should provide a day service between Flushing and Harwich in place of the service to Folkestone, but after various negotiations it was decided between the Zeeland Company and the S.E. & C.R. that the Folkestone service should become a day service and the Zeeland Company no longer ran a night service. The S.E. & C.R. at the same time arranged a night service to Holland via Gravesend by utilising the Batavier Company's steamers.

The day service by the Zeeland Company's boats to and from Folkestone continued till December, 31, 1926, when, in consequence of the Zeeland Company arranging terms with the L.N.E.R., the service transferred its English port to Harwich, thus terminating its connection of over 50 years with the L.C. & D.R., and its successors the S.E. & C.R. and the Southern Railway. Harwich, which previously had been concerned with night

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sailings only, consequently now has day departures as well, and also evening arrivals. The distance from Harwich to Flushing is about the same as from Folkestone. The departure from London remains at 10 a.m. but is from Liverpool Street instead of from Victoria.

Whilst the Zeeland Company's service was located at Folkestone a large fresh meat traffic (principally pork) was built up. This was dealt with by the Southern Railway in an efficient manner, special arrangements being in force for loading and despatching the meat trains to London each night. The prohibition a few months ago of meat importation from the Continent because of foot-and-mouth disease was a severe blow to the Zeeland Company. Travellers from Folkestone to Flushing had a mild excitement in the daily races with the Ostend boats which left Dover at the same time as the Flushing boat departed from Folkestone and had a seven-mile start, the course of the two routes being much the same for a considerable distance.

NO. 4 TORONTO EXPRESS, CANADIAN PACIFIC RAILWAY.

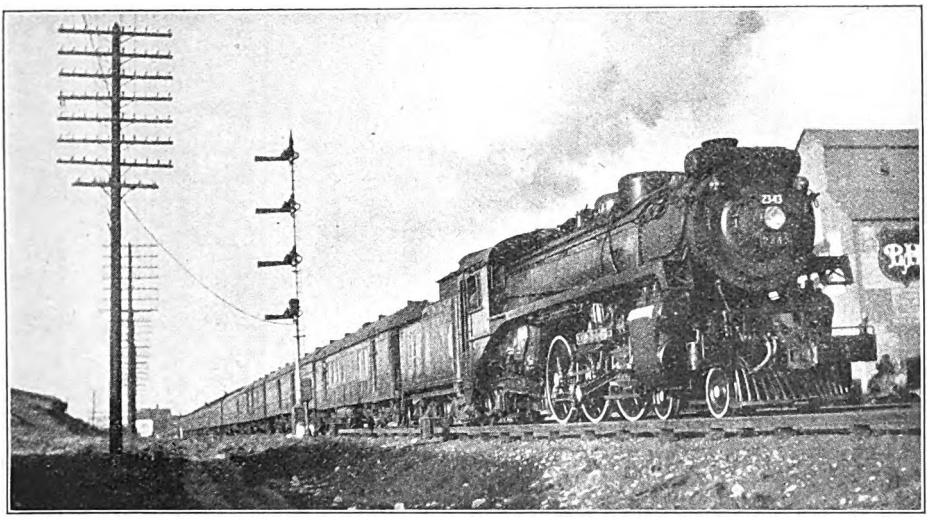

Photo.] [*C. R. Littlebury.*

This view, taken by Mr. C. R. Littlebury, of Calgary, Alberta, shows the No. 4 Toronto Express, Canadian Pacific Railway, at East Calgary, drawn by one of the new 4-6-2 engines recently placed in service. These engines were illustrated and described recently.

The feed-water heater is located on top of the smokebox, in front of the chimney.

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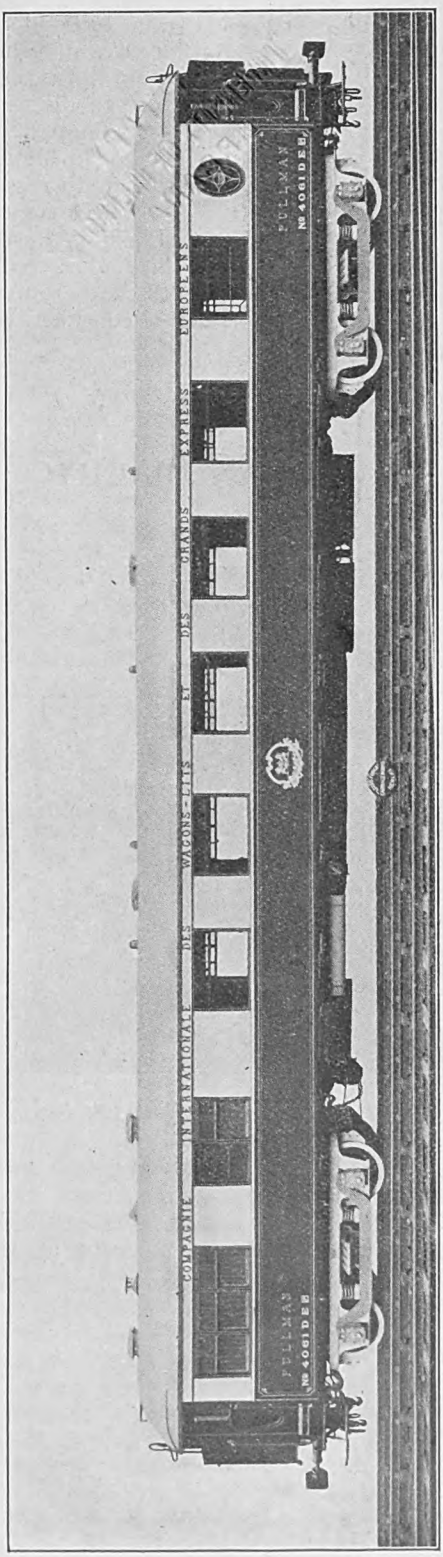
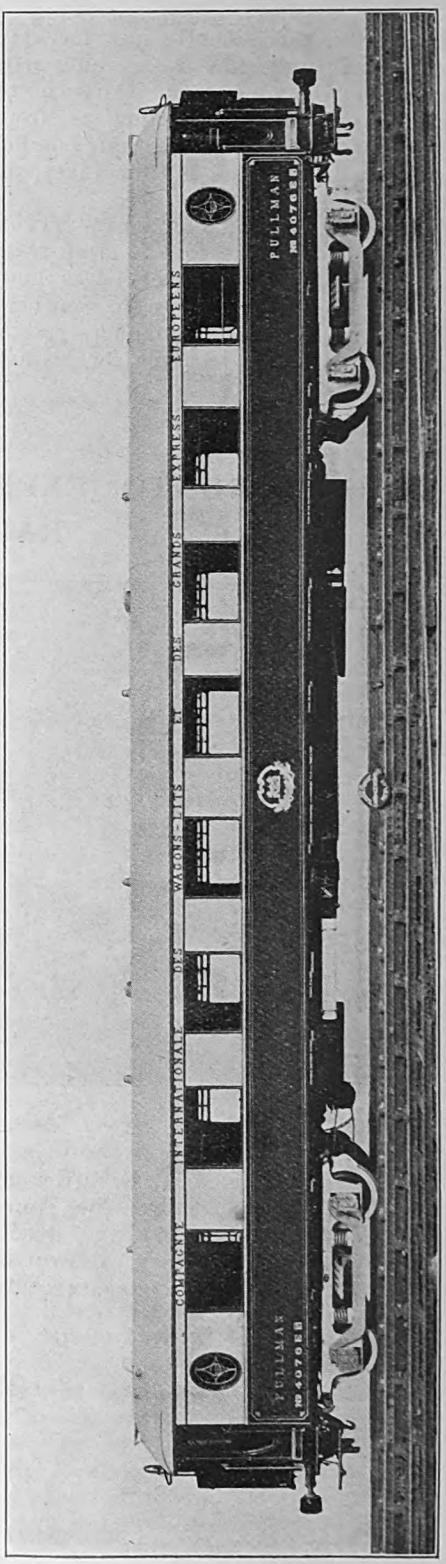


KITCHEN AND PARLOUR PULLMAN CAR FOR CONTINENTAL SERVICE.



PARLOUR PULLMAN CAR FOR CONTINENTAL SERVICE.

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British-Built Pullman Cars for Continental Service.

AN order for 30 Pullman cars, placed by Sir Davison Dalziel on behalf of the Compagnie Internationale des Wagons-Lits et des Grands Express Européens, was recently completed at the Newlay Works of the Leeds Forge Co. Ltd., Leeds, the last five vehicles being scheduled for despatch to the Continent on Saturday, February 5, by train ferry from Harwich, and due to reach Zeebrugge about the middle of the following week. Those already running are said to be giving the greatest satisfaction. It is, perhaps, fitting to note that the original all-steel sleeping cars for the Wagons-Lits service from Paris to the Riviera, the now well-known "Blue Train," were designed and constructed by the Leeds Forge Company. The new Pullman cars, finished in cream and blue, are for day service and are worthy companions to the Blue trains.

The despatch on February 5 of the vehicles now under notice marks the completion of the important combined order placed on behalf of the International Sleeping Car Company by Sir Davison Dalziel, President of the Board of Directors, and of the Managing Committee. These cars represent the high-water mark of railway carriage construction, in that they combine the maximum of passenger comfort and convenience with a degree of finish and artistic decoration upon which it would be difficult, or indeed impossible, to improve. The combination of Sir Davison Dalziel's acknowledged experience and foresight, and the efforts of the great British rolling-stock manufacturing firms, is one which might be expected to culminate in the production of a *de luxe* type of railway passenger vehicle in its highest form, and the result has proved this anticipation correct. The placing of an order of the value represented by no fewer than 150 of the latest and most developed type of Pullman vehicles in this country for Continental service has had the effect not only of assisting in the provision of work when it was badly needed, but will also have the further and equally important effect of enhancing British prestige abroad where the design and manufacture of railway coaching stock are concerned. In a previous issue we dealt with the leading characteristics of the cars on the Paris–Calais and other services, and we describe below the latest additions to the number sent out, and which are now used for the service between Nice and Milan, which was inaugurated on December 15, 1925.

On Tuesday, February 1, a small party, consisting of officials of the Leeds Forge Company and representatives of the press, travelled to Leeds for the purpose of inspecting the last few cars, then practically ready for shipment from England to the Continent. The party on the outward journey travelled by the 10.10 a.m. corridor express from King's Cross, a Pullman car being placed at their disposal by the courtesy of Sir Davison Dalziel. Luncheon was served during the journey, and on arriving at Leeds the guests were conveyed in motor-cars to the Newlay Works of the builders, where, after making a thorough inspection of the new Continental Pullmans, they were enabled to witness the various processes involved in the manufacture of wheels for rolling-stock, orders for railways at home and abroad being then in course of execution.

The visitors proceeded later to the Armley Works of the Leeds Forge Company, being conducted round the shops by principal officers of the concern, including Mr. A. S. Bailey, Managing Director, Messrs. F. L. Lane and A. J. Boyd, Directors, Messrs. A. W. Kidd and W. Redpath, General Managers. These shops have recently been rearranged to some considerable extent, the machinery section being extended and measures on a wide scale taken to enlarge the capacity of the works, while speeding up output and generally improving the facilities for the distribution and rapid and thorough execution of the work to be performed. The main shop represents a very fine example of a modern lay-out for the construction of rolling-stock, underframes, bogies, &c., and is capable of undertaking orders on the largest scale with increased expedition.

The party, after being entertained to

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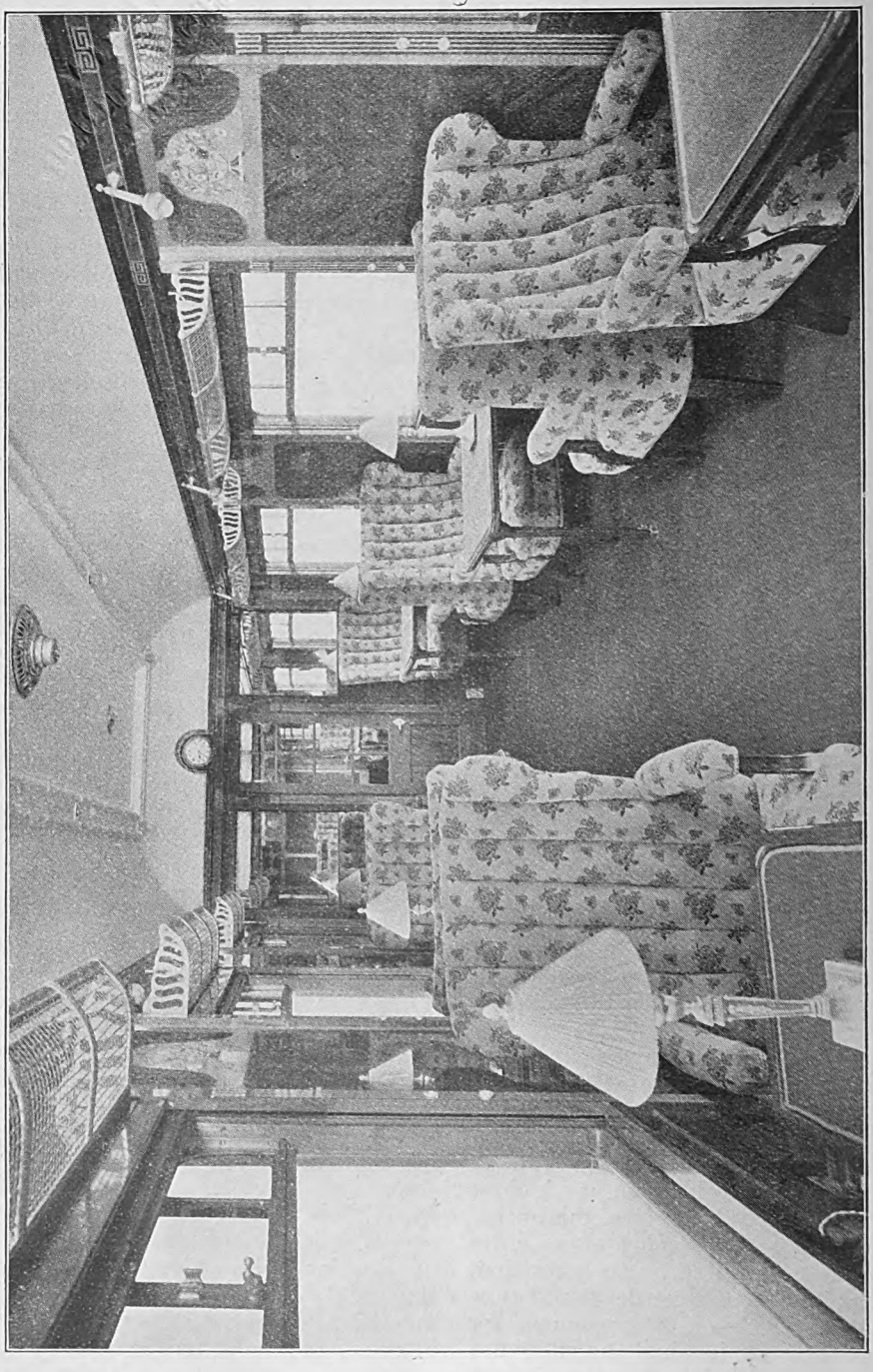

EXAMPLE OF INTERIOR DECORATION, EQUIPMENT AND UPHOLSTERY.

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ea in the works office building, entrained or London, the return journey being made by the 5.30 p.m. from Leeds Central station, to which the Pullman car used on the outward trip was attached. Dinner was served during the course of the ourney.

Except that the new cars of necessity conform to the Continental running gauge and to the standards of the French, Belgian and Italian railways, they are in many respects similar to the English Pullmans; and, by special request, the interior finish and decorations of the first two vehicles, known as the "Argus Cars," are identical with the English Pullman cars built by the Midland Railway Carriage & Wagon Co. Ltd., Birmingham.

The parlour cars have two large open saloon compartments, each seating 12 passengers, and two coupé compartments, one at each end of the car, each for four passengers. The kitchen cars, similarly, have two large saloon compartments, one seating 12 and one eight passengers. One end of the car has a coupé compartment for four passengers, while at the other end are situated the kitchen and pantry.

The saloons are noteworthy for their spaciousness and the evident intention to make the comfort of the traveller the prime consideration. The chairs are of the large Pullman type, arranged two to each table, which latter in turn are arranged at each window. The windows are large and provide an ample outlook, the lower portion being fixed and the upper arranged to slide for ventilation. The ceilings, painted a dead white, have a raised flat middle portion, bordered by a heavy decorated mould, on which are spaced the ceiling lights. This, together with the coved sides and ends, gives a very pleasing appearance.

The interior walls, *i.e.*, sides and partitions, are finished and decorated in various styles, this work being carried out by Waring & Gillow Limited, London. In all there are 15 different designs, including the mirror scheme of the "Argus Cars," styles in quartered mahogany panels, inlaid schemes in mahogany, Patapsee, &c., and lastly, two cars with a very fine interior in Chinese lacquer, the carpets, chair upholstery, &c., varying in colour and design to tone and match with the different interior schemes.

In addition to the ceiling lights mentioned above, torch fittings are arranged along the cornice, and each table is provided with a portable table lamp and shade of artistic design. A double-dial clock of the 24-hour type is provided on the intermediate partitions between the two large saloons. The saloons and coupé compartment are heated by means of low-pressure steam heaters extending along the body sides near the floor, from partition to partition.

The kitchen equipment comprises cooking stove, hot plates, sinks with hot and cold water, chopping block, ample cupboard space for crockery and linen, racks for plates, hooks for saucepans, and also a griller. The stove is of the large coal-burning variety, and is arranged to heat the water for the hot water supply. In conjunction with the stove, two circulating tanks are fitted in the roof, and in addition a large tank is carried over the corridor ceiling for the cold water supply. The tanks and piping are of copper. A new feature compared with previous cars is the double (upper and lower) sliding door, provided with hinged flap tables, giving access between kitchen and pantry.

The whole of the kitchen interior, *i.e.*, body side, end and ceilings, is of steel. The corridor partition also, behind the stove, is of steel, heavily insulated and provided in its thickness and over its entire area with a space for the flow of a cold air stream entering from the corridor near the floor and issuing into the upper part of the kitchen immediately under the ceiling. In addition, the partition incorporates a flue extending for the length of the stove, for the purpose of carrying away the hot air and gases from the latter up to three-roof torpedo extractors. With the exception of the stove, and the galvanised coal box, refuse boxes, &c., the kitchen is finished in white enamel, giving a very clean appearance.

The pantry has a varnished wood finish and is fitted with zinc-lined food cupboards which, in the case of those for the storage of meat, fish and wines, are heavily insulated and provided with ice refrigeration. For the rest, the equipment comprises shelves for glassware, drawers and cupboards for silver and linen, and two sinks supplied from the kitchen tanks with hot and cold water. The whole is

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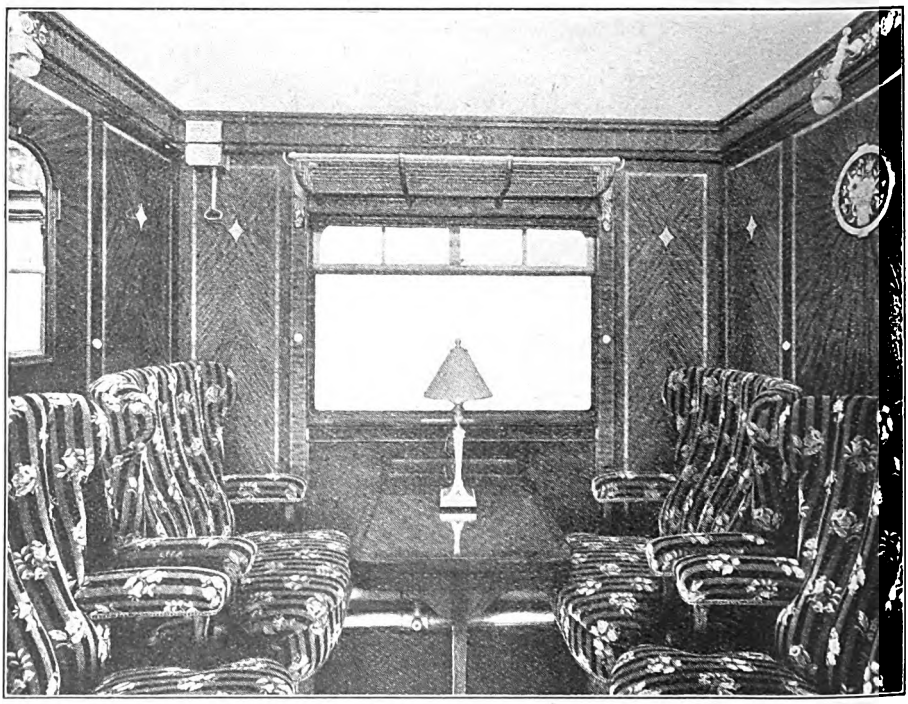
provided with heavy bronze fittings and special sealing brackets for Customs purposes.

The lavatory of each type of car is provided with hot and cold water. The walls are of polished mahogany, and the floor of a composition marbled to give a terrazolith effect. The fittings, taps, coat hooks, ventilator, &c., are silverplated. Hopper and cistern, together with wash basin and other fitments, are of a type similar to those used on the English Pullman cars.

The end corridors are finished in polished steel, painted and polished to give the appearance of mahogany. Cupboards are fitted in the ceiling and on the platform ends. The hand brake is fixed on one platform of each type of car.

The following are the leading dimensions :—

	English. ft. in.	French. m.
Length over buffers ..	76 11½	23·452
,, headstocks ..	71 11⅞	21·940
,, platform ends	72 10⅛	22·200
,, main body ends	67 3⅛	20·500
Width over outside cornices	9 5½	2·882



INTERIOR OF COUPÉ, SHOWING TYPICAL DECORATION, ETC.

mahogany. The floor is covered with carpet for the length of the coupé, and beyond the coupé to the body with Pullman type black and white interlocking rubber tiles. Ample luggage accommodation is provided by three shelf units, one large and one small unit at the end of car opposite to lavatory in the parlour car only, and on both types of car, one small unit at the lavatory end. The parlour car also includes, at the lavatory end, the conductor's folding seat and table. The platform interiors are of

Width over waist moulding	9 4 1/16	2·847
Height from rail to top of roof mouldings	13 1⅝	4·004
Height from rail to centre of buffer	3 5⅜	1·050
Centre of bogies	52 6	16·000
Bogie wheelbase	8 2 7/16	2·500
Diameter of wheels	3 5⅜	1·050

The cars are painted blue on the lower panels and cream on the upper. The panels, windows and main mouldings are tastefully lined in gold and the roof is painted white. On the fascia board

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above the windows the letters are of bronze, black oxidised. On the centre of the lower panel is placed the coat-of-arms in polished bronze, and on the ends are fixed the polished bronze letters, "Pullman."

Each parlour car has accommodation for 32 passengers, and each kitchen car 24 passengers. The parlour cars each weigh 46 tons 12 cwt. (47·4 tonnes), and the kitchen cars 50 tons 4 cwt. 3 qr. 25 lb. (51·0 tonnes).

The whole of the car structure is of steel. The various components of which the structure is built are first assembled from their detail parts into separate units on special jigs. These jigs make possible not only interchangeability and a much accelerated speed of manufacture, but in the erected car ensure that strict accuracy in size, which is so necessary to enable the various sections of interior finish to be fixed into position without any hand fitting. The body sides are constructed of vertical pressed pillars connected together longitudinally by rolled angle sections, and the whole covered by steel sheeting held down firmly by mouldings. The window openings are pressed into the upper panels. The platform and body ends are built up of pressed-steel pillars and rails similarly sheeted.

The roof structure is composed of transverse steel members pressed to the contour of the roof, connected together by longitudinal angles, and the whole covered by steel sheets, the lap joints of which are held down by mouldings to prevent any possibility of leakage. On the inside, steel members are arranged to carry the covered ceiling, tanks, and lavatory flat ceilings. The roof is designed in such a manner that the tanks can be removed through the outer skin, thus minimising the disturbance of the interior finish. The floor is of key section corrugated steel on which is laid an insulation and fireproof composition. In the saloons, coupé compartment and corridors this is of a specially light variety, on which is then laid the felt, linoleum and carpet. In the kitchen and pantry, however, the composition is made heavier and harder to withstand wear.

The whole of the body outer sheeting on the inside is covered with insulating material; on the roof and sides this is of Celotex, and on the ends the sheets are lined with canvas. Provision for the attachment of the interior finish is made by means of the Leeds Forge patent fibre block method, which consists in securing the interior finish by wood screws to special fibre blocks riveted to the steelwork.

The type of underframe as originally designed by the Leeds Forge Company for the Blue Train has been adhered to with the exception of some slight modifications carried out to reduce weight. The notable features of this design, which is patented by the Leeds Forge Company, are the cast-steel ends, main centre longitudinal fish-bellied girder and through crossbars.

The solebars are made of rolled "Z" sections connected firmly to the tail pieces of the end castings, and arranged so as to form landings for the bottom angles of the body sides. The buffing gear is of the equalising type, the ends of the buffer shanks being fitted with shoes bearing on large laminated springs and connected by equalising bars. Inside each buffer case a cast-steel plunger is inserted, the front of the plunger projecting slightly beyond the front of the case and the back bearing on indiarubber pads. This reduces the shock on the headstocks in the event of the collars behind the buffer heads being driven up to the cases. Provision has been made in the construction of the end casting for the easy erection of the buffing and draw springs into position, a removable cradle being bolted to the underside of the casting at the centre, the lower portions of the diagonals also being made removable. These removable parts of the diagonals are tightly wedged up by the insertion of wedged pieces fitted between the front ends and the main casting, thus relieving the latter from eccentric buffing moments.

The hand brake operated from the platform has already been mentioned. The system of power brake used is the Westinghouse. The power is obtained from a cylinder 17 in. diameter, which, through the medium of an intermediate shaft, actuates a pair of brake shafts and thence is transmitted to the brake blocks by suitable rigging.

The bogie frame consists of one steel casting, of which the axle-guards, bolster suspension brackets, block hanger brackets,

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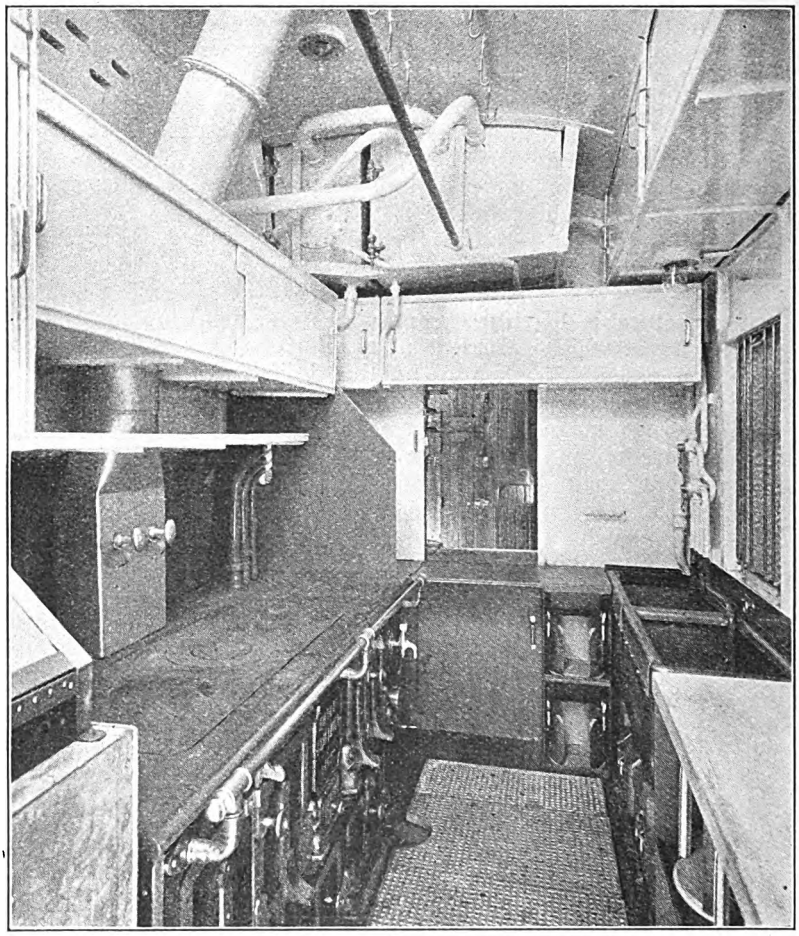

INTERIOR OF KITCHEN.

&c., are cast to form integral parts, thus reducing the number of pieces in the finished bogie to a minimum. The wear of pin holes, &c., is provided for by the insertion in the casting of hard steel bushes. The axle guards and bolster-wearing surfaces are faced with suitable liners.

The bolster and spring planks are of cast steel. The bogies, of the equalising beam type, are designed with a view to obtaining the easiest possible riding of the cars, and the trials have proved that this has been effectively obtained. Each nest of bolster springs consists of four double elliptical springs, and each nest of side-bearing springs of three helical springs. The wheels, axles and axle-boxes are of the Wagons-Lits standard as required by the railways over which the cars will be operated.

Stone's system of electric lighting is incorporated. The current for the lights and the two large ceiling extractor fans is generated by a dynamo slung from the underframe and driven by a belt from a pulley attached to one of the axles, the current passing to a pair of accumulator boxes also supported from the frames. The heating system is of the low-pressure type manufactured by the Laycock Engineering Company. As already described, the saloon and coupé compartments are fitted with longitudinal heaters extending from partition to partition, and the hot water supply to the lavatory wash basins is provided for by a lighter incorporated in the system.

It would, we think, be difficult, if not indeed impossible, to improve upon the excellent design and appearance of these new cars, both externally and internally. The degree of comfort afforded is the highest imaginable, while the general scheme of the appointments, combined with the artistic styles of decoration adopted, give an all-round impression of the utmost refinement in railway carriage construction. Both Sir Davison Dalziel and the Leeds Forge Co. Ltd. are to be congratulated on the result of their efforts, representing as it does a British achievement of a very high order.

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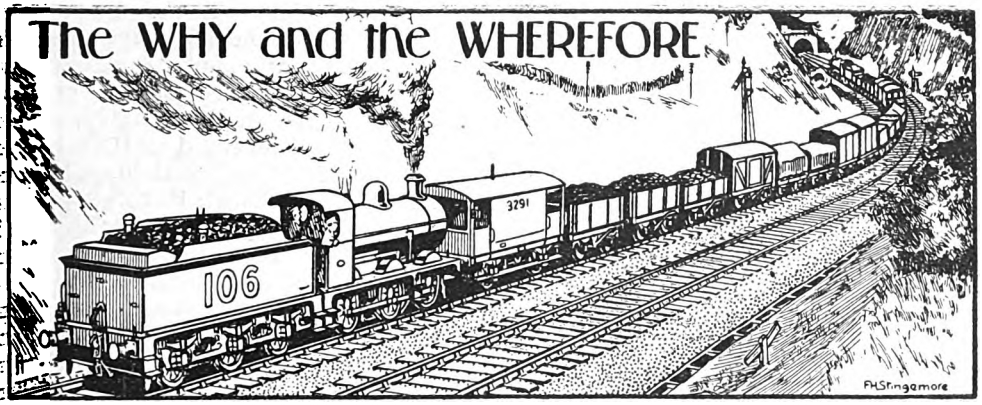

RAILWAY MAGAZINE readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o RAILWAY MAGAZINE, 33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-ninth Annual Edition (1926) of this standard railway reference work is now published. All previous Editions are out of print.

Connecting Line at Dorking, S.R.

The line which formerly connected the S.E. and C. and L.B. and S.C. Railways just south of the point at which the Reading–Redhill branch crosses over the London–Horsham and Portsmouth line at Dorking was put in for Government purposes only, presumably in order to facilitate the movement of troops between Aldershot and points on the L.B. and S.C.R. No regular services were worked over it at any time. The actual physical connection with the S.E. and C.R. was removed many years ago, and the line remained as a siding until finally taken up last year. It was regularly utilised for the storage of suburban trains which worked between Dorking and London until additional accommodation was provided for them adjacent to Dorking station. Latterly, it had been used for the storage of trains at Bank Holiday periods. There were also several other sidings alongside many years ago. The piece of land on which they were built was used as a dumping ground to receive the material excavated from the Betchworth Tunnel after it had fallen in on the day prior to that commencing Goodwood Race Week in the summer of 1887. Subsequently these lines became entirely disused, and have since been removed.

[Reply to "S.E. AND C.R."]

Signs on Signal Boxes.

Before the days of general telephonic communication, it was usual to place outside signal boxes various signs in the form of discs, diamonds, &c., which indicated whether the services of a lineman or signal repairer were required. The idea was that when one side of the disc was shown, the first official of the grade required who passed, and who generally looked out at each signal box when he travelled by one, would alight prepared to give the attention required. When all was in order the normal face of the disc or board was exhibited. The signs you have noted on the Dublin and South Eastern section of the Great Southern Railways of Ireland are, presumably, of this order, though, to a large extent, the practice is dying out, as the telephone enables requirements to be met much more conveniently. We have no exact information as to the date when the new line between Bray and Killiney was brought into use.

[Reply to C. J. COGHLAN.]

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"Pacific" Type Locomotives, L.N.E.R.

You are correct in stating that the original Gresley 4-6-2 "Pacific" type locomotives in service on the L.N.E.R. were built by the G.N.R. These engines were constructed at Doncaster, and bore the numbers 1470 to 1481, later altered to 4470 to 4481 after the grouping. The first of the series, No. 1470, appeared in the early part of 1922. After the amalgamation a further batch of these engines was built, some by the L.N.E.R. at Doncaster, and others by the North British Locomotive Company at Glasgow, but the design was slightly modified to permit of the engines being used over the main lines of all sections comprising the L.N.E.R. group south of Edinburgh and Glasgow. These later engines bear the numbers 2543 to 2582. The remaining 4-6-2's, numbered 2400 to 2404 in the L.N.E.R. list, were designed by Sir Vincent Raven and placed in service on the N.E.R. prior to the amalgamation.

[Reply to "LADY ROWENA."]

Lighting of Railway Trains in Tunnels.

It is a recognised practice on all railways, in the case of trains running on sections where tunnels are numerous and/or lengthy, that provision shall be made for lighting carriages during daytime, either by switching on or off by the guard or by having lights on continuously. We are not aware, however, of any actual regulation in this respect governing the application of this principle. Where trains run without light through tunnels, it will usually be found that the tunnels are very short, although there may be several of them on a given route. We are not aware that G.W.R. trains ever worked into Charing Cross station, S.R., but local trains, as also at one time a Birmingham express, formerly ran regularly into Victoria station, while horsebox, milk and other trains still make use of the rights which the G.W.R. has in regard to user of the S.E. & C.R. side of the station.

[Reply to "STAFFORDSHIRE KNOT."]

Continental Railway Gauges.

While, speaking generally, the 4 ft. 8½ in. gauge is universal, there are slight variations owing to the use of a convenient metrical equivalent in countries where the metric system of measurement is employed. This makes the Continental gauge slightly loose to the British, but the difference is not sufficient to render running unsafe, though it explains why, apart from overall dimensions, Continental vehicles—unless adapted for service in this country, as is the case with those engaged on train ferry service—cannot run on British lines, being rather too tight, although British vehicles and engines can safely run on Continental lines. The line from Swanley Junction, via Eynsford, through Maidstone to Ashford, was originally the property of the London, Chatham and Dover Railway.

[Reply to G. E. TENTON.]

Impulses per Revolution of Driving Wheels, S.R. Locomotive.

The explanation of the eight impulses per revolution of the driving wheels of the S.R. 4-6-0 locomotive *Lord Nelson* is as follows:—There are four cylinders in this engine, and as each cylinder receives steam once in front and once behind the piston during each revolution of the driving wheel, this gives a total of eight impulses per revolution. The cranks are so arranged that, instead of two of the impulses occurring together, as is the more usual arrangement of cranks for four-cylinder engines, each occurs independently, thus giving eight separate impulses followed by the corresponding exhaust beats per revolution.

[Reply to C. HANCOCK.]

Articulated Locomotives.

Both the "Garratt" and "Modified Fairlie" locomotives have the two sets of wheels arranged in movable frames, whereas the "Mallet" type has one set only free to move radially with respect to the rear set, which is carried by the main frames. The special feature of the "Garratt" type is, however, that the two sets are sufficiently far separated to allow the boiler to be fitted between them to avoid restricting its dimensions, whereas the "Modified Fairlie" type maintains the use of a main frame, to which the frames of the respective sets of wheels, &c., are connected.

[Reply to J. FOX.]

Midland Section Locomotives, L.M.S.R.

The Midland Railway had no express locomotives larger than 4-4-0, mainly because there were certain sections not adapted for larger types, while the operating methods in force, influenced by the

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system of alternative routing of express trains via Leicester or Nottingham, rendered 4-4-0 engines sufficiently powerful to deal with most of the express trains, with occasional instances of double-heading if one engine's load were exceeded. Nottingham (Midland) station was described in the October, 1904, number of THE RAILWAY MAGAZINE. It will probably receive further attention in due course. [Reply to S. WATTHEY.]

Waterloo Station.

The present station was exhaustively described, with a plan, in the May, 1922, number of THE RAILWAY MAGAZINE. This issue is now out of print. You can, however, purchase a pamphlet describing the station, and with plan, published by the *Railway Gazette*, price 2s. 6d. At one time or another most of the lines within the area indicated by you have been described, though not in issues which are still in print.

[Reply to W. G. A. THOMAS.]

Midland Compounds, L.M.S.

On these engines the reversing gears to H.P. and L.P. cylinders are worked off the same reversing shaft, there being no possibility of varying H.P. cut-off independently of L.P. cut-off. The two cut-offs are, however, arranged differentially, with a suitably later cut-off in the H.P. than in the L.P., as you have rightly imagined. We have not the exact figures that you desire; the total number of these engines now at work we believe to be approximately 200. [Reply to G. H.]

Maximum Speeds on Central Section, S.R.

To our knowledge the highest authenticated speed on the late L.B. and S.C.R., as well as the fastest run between Victoria and Brighton, were achieved on July 26, 1903, when the Sunday "Pullman Limited" covered the distance of 51 miles in 48 min. 41 sec., start-to-stop. A Billinton 4-4-0 engine, *Holyrood*, was employed, driven by Tompsett, and with a trainload of 130 tons touched 90 m.p.h. at Wivelsfield.

[Reply to "LA FRANCE."]

French Compound Engines, G.W.R.

Very little in the way of reliable data is available in regard to the performance of these engines, which are now employed on secondary duties only, and it is not therefore possible to make the detailed comparison that you desire. In any case we would hazard the opinion that it needs a French driver, with the methods of training that obtain in France, to get the best out of a French compound.

[Reply to J. H. C. CHAPMAN.]

N.E. Section "Atlantics," L.N.E.R.

The principal difference between classes "V" and "Z" 4-4-2 locomotives of North Eastern Railway design is in the number of cylinders. The engines of class "V," for the design of which Mr. Wilson Worsdell was responsible, have two cylinders, while those of class "Z," constructed during Sir Vincent L. Raven's régime as Locomotive Superintendent of the N.E.R., are three-cylinder engines.

[Reply to "NEIL GOW."]

Cost of Painting Locomotives.

This must, of course, vary according to the class of engine and whether the painting includes elaborate lining out, &c., or not. Consequently, any figure as to the cost which might be given would apply only to the particular class of engine under consideration. We have no record as to the actual numbers of 4-6-0 engines of the "Hughes" and "Claughton" classes in service on the L.M.S.R.

[Reply to G. C. WILSON.]

Named Locomotives, N.B. Section, L.N.E.R.

The only locomotives on the N.B.R. carrying names at the time of grouping in 1923, were those of the Class "K," "Glen," 4-4-0 series, the class "J," "Scott," 4-4-0 series, the class "H" 4-4-2 "Atlantics," and a number of class "C" 0-6-0 goods locomotives which had been employed on war service.

[Reply to "NEIL GOW."]

Railway Signalling.

We know of no university or technical college course dealing with this subject by correspondence or in any other way, although most of our railways hold courses of instruction in signalling for their own servants. We fear we have not space in which to deal with your other query; you should study "British Locomotive Practice and Performance."

[Reply to J. PROBERT.]

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Edge Hill Light Railway.

This line was organised some years ago to serve a mining area which was in course of development adjacent to the former Stratford-upon-Avon and Midland Junction Railway. Prior to grouping, it was referred to in the article dealing with the railway given in *The Railway Year Book*. We have no information as to the further progress of the undertaking.

[Reply to R. H. WILD.]

Wivenhoe-Brightlingsea Branch, L.N.E.R.

The bridge you have noted on this branch is one of an opening character, over which trains are taken by a pilotman. The signals are therefore fixed at "danger," as the trains are not actually signalled, but are conducted over the bridge. The discs are indicators applying to water traffic. Items for "Locomotive Matters" have been duly noted.

[Reply to "HOCKERILL HALT."]

Routes of Football Trains.

Football excursion trains from Kew Bridge, South Acton, and Acton Central to Upton Park would travel via the North London line, using the curve near Dalston Junction station and the loop from Bow to Bromley, Tilbury section. They would necessarily be steam-hauled, as the North London route between Dalston Junction and Bromley is not electrified.

[Reply to W. E. S.]

8-Wheeled Tenders.

We cannot call to mind any locomotives on the London Midland and Scottish Railway which have eight-wheeled tenders. The Leek and Manifold Light Railway was described in the September, 1904, and April, 1917, issues of THE RAILWAY MAGAZINE. These issues are, however, long since out of print.

[Reply to C. HANKINS.]

Rail-Lengths, G.S. Railways (Ireland).

On the Great Southern and Western Section the standard length is 45 ft., but the rail-joints are "staggered" (the centre of one rail being opposite the joint in the other), which except to the expert ear gives the impression of 22 ft. 6 in. rails. There may also be a few lengths of 30-ft. rails in places.

[Reply to "FARRANALLEEN."]

Clifton Junction and Patricroft Connecting Line, L.M.S.R.

So far as we are aware, this line is used for goods traffic only, though it is, of course, available for the operation of special and other passenger trains as need arises. We do not know the actual length of the tunnel thereon, but it appears to be about half a mile long.

[Reply to N. H. BAILEY.]

G.W.R. Locomotive, "Hook Norton."

This engine has several times been referred to in our pages. The last reference arose out of an article published in the July, 1924, number, and subsequent references on page 234 of the same volume. We have no information as to why mention thereof is not included in the 1926 edition of the G.W.R. engine book.

[Reply to H. N. WOOLHOUSE.]

L.N.E.R. "Single" Locomotives.

We believe that all the North Eastern single-driver locomotives have now been scrapped, though one or two remained in service until quite recently. The December, 1925, number of THE RAILWAY MAGAZINE can still be obtained at the published price plus postage.

[Reply to C. MOISLEY.]

Edinburgh Pullman Express, L.N.E.R.

We are not aware that there is any intention to use "Pacific" locomotives for this train south of Harrogate. It has, however, been frequently worked for a long time past by 4-6-2 locomotives between Harrogate and Newcastle, and occasionally between Newcastle and Edinburgh. [Reply to C. K. DOUGLAS.]

Locomotive Failures.

In that, now and then, even engines otherwise in the best of condition occasionally fail from one cause or another, not necessarily in a serious manner, it is to be presumed that the delay to the express in which you travelled was one of these incidents. We have no further details. [Reply to C. MACDONALD.]

"Castle" Class Engines, G.W.R.

Queen Philippa is one of several "Star" class 4-cylinder 4-6-0's which have now been rebuilt as "Castles," and the fact has been mentioned on a number of occasions in these columns. We have not the answer to your other query.

[Reply to J. A. CATTELL.]

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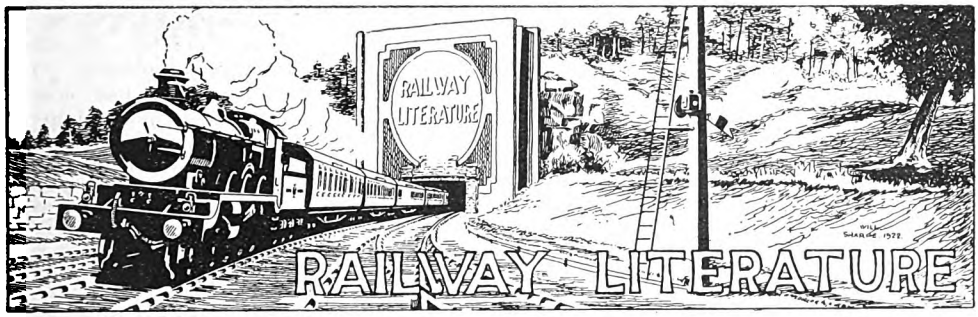

THE CHRONICLES OF BOULTON'S SIDING. By A. R. Bennett, M.I.E.E., M.I.Loco.E. Locomotive Publishing Co. Ltd., 3, Amen Corner, Paternoster Row, London, E.C.4. Price 6s. 6d. net.

This volume is based upon a series of articles published in *The Locomotive* between November, 1920, and February, 1925, but takes into account many new facts which came to light, the whole being carefully revised and rearranged. The author is well known as an authority upon locomotive history, while his years carry him back to a period which brought him into touch with many developments unfamiliar to most readers of a younger generation. "Boulton's Siding"—"a by-word with railwaymen of the past"—represented the premises of Isaac Watt Boulton at Ashton-under-Lyne. He was a relative of Matthew Boulton, associated with the historic firm of Boulton & Watt, of Soho Foundry, Birmingham, a relationship which explains his second Christian name. Isaac Watt Boulton was an apprentice under Richard Peacock, on the old Sheffield, Ashton and Manchester Railway, and throughout his business life maintained cordial relations with the firm of Beyer, Peacock & Co. Ltd., of which that gentleman became a member. After working with his father on canal business, he built a steam coach, which in 1849 ran between Ashton and Manchester; and in 1854 he joined the locomotive staff of the Manchester, Sheffield and Lincolnshire Railway. In 1886 he set up as an engineer, and after dealing with marine work, tools, &c., he began to buy up old locomotive engines, putting them into working condition and hiring them out whenever opportunity arose. He also built small industrial locomotives, while he supplied many of his second-hand engines to small railways and occasionally to large companies.

This work developed to such an extent that a siding was built to connect his works with the Oldham branch of the M.S. & L.R., with the result that, in the course of years, "all sorts and conditions" of locomotives were to be seen there at one time or another. Quite a big business was done for a long period, but in the 'eighties, fortunes began to wane, until, in 1894, work was almost entirely suspended, and the workshops were finally disposed of in 1898. Mr. Boulton died in 1899.

The general facts are outlined by Mr. Bennett in an interesting foreword, and this is followed by 24 chapters, with 93 illustrations, describing the many engines which received attention at "Boulton's Siding," and the rebuilding and other changes made in them to give them new leases of life. Among them were many old locomotives obtained from early railways, besides all sorts of odd engines built by small firms. The majority would be classed as contractors' types, usually small, but some possessed historic interest on a main-line basis. Mr. Boulton also reconstructed and altered many engines, producing some queer machines, including geared and other special forms. He was also responsible for the application of water-tube boilers to many locomotives.

Mr. Bennett, with the assistance of the late Mr. James Watt Boulton, son of Isaac Watt Boulton, has collected a great deal of information, which is entertainingly presented, about these engines. Drawings and a few half-tone illustrations are freely given, in conjunction with personal reminiscences dating back to the 'fifties. Incidentally, the mystery of "Fowler's Ghost," the "hot-brick" engine built before the Metropolitan Railway was opened in 1863, is cleared up, while several other aspects of locomotive history, in which Isaac Watt Boulton was concerned in some degree, are dealt with. Altogether, an interesting book which can be cordially recommended, not only to readers historically inclined, but also to all interested in locomotive development and practice.

THE LOCOMOTIVE OF TO-DAY. Locomotive Publishing Co. Ltd., 3, Amen Corner, Paternoster Row, London, E.C.4. Price 5s. net.

Originally based upon articles published

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by our contemporary, *The Locomotive*, this book has seen several successive editions, of which that now under notice is the eighth. Each re-issue has involved a considerable amount of revision and the inclusion of new material, and this applies even further to the present edition, so that it ranks as a simple yet complete handbook of locomotive practice and appliances which will be appreciated by practical locomotive engineers and largely suffice to meet all the requirements of those who need only to understand the construction and operation of the locomotive engine and associated appliances and details.

There are five sections, devoted, respectively, to boilers, cylinders and motion, frames and wheels, tenders and tanks, and articulated designs, each including a series of collective pages of drawings and diagrams to the number of 66. The text, which is clearly and simply expressed, and a full index, complete the 316 pages which are included. The frontispiece shows a representative footplate view, while at the end there is a large folded plate (with reference to table of parts) showing the construction of one of Mr. H. N. Gresley's well-known three-cylinder 4-6-2 engines for the L.N.E.R. A new feature is that each of the collective pages of drawings and diagrams is faced by a corresponding blank page for the reception of notes and sketches which the user may desire to associate with those given, which cannot, of course, cover every variation of practice. That earlier editions have been greatly appreciated is well within our own knowledge; we anticipate for this new edition an even wider acceptance, from old readers as well as new ones.

ELECTRIC TRAINS. By R. E. Dickinson, B.Sc. (Eng. Lond.), Assoc.M.Inst.C.E., A.M.I.E.E. [London: Edward Arnold & Co., 41 and 43, Maddox Street, W. 292 pp., 6 folding plates and 132 other illustrations. Price 16s. net.]

Despite the rapid development of electric traction in its application to railways during the last few years, there is, as yet, a somewhat remarkable dearth of literature on the subject which may be described as sufficiently up to date, and at the same time within the scope of the student or of the practical railway engineer. An attempt to meet this need is to be found in the work at present under review. It is primarily addressed to the railway engineer, and deals with the fundamental principles of electric traction and the apparatus and devices in use, and sets forth some convenient methods of making calculations required in practical working. For the benefit of the student, however, mathematical calculations have been written as simply as possible, and methods worked out from first principles rather than from formulæ have been preferred. Questions of generation, transmission, and transformation of electric power have been entirely omitted, but contact systems have been included, as they are inseparable from the train elements. The text is amply illustrated by the provision of 132 illustrations, chiefly line drawings, but including also several half-tone illustrations, together with six folding plate diagrams. The 14 chapters cover in a complete manner the various systems of electrification in use on railways in this country and abroad, and also outline the elementary considerations involved in railway electrification. In the final chapter complete calculations in connection with an actual electric train equipment are set out, and a well-arranged index is provided.

LES LOCOMOTIVES ARTICULÉES. By Lionel Wiener, Chargé de cours a l'Université libre de Bruxelles. [Imprimerie F. van Buggenhoudt, S.A., 5-9, rue du Marteau, Bruxelles.]

This work, written in the French language, covers in a very complete manner the subject of articulated locomotives, and in many respects the work has been brought fully up to date, evidence of this being found in the reference made to the Garratt locomotives ordered by the L.M.S. Railway for working between Toton Sidings and Hendon. The types of articulated locomotives covered comprise all the well-known ones, and a few of lesser familiarity, the majority being illustrated in various forms. Thus we find illustrated particulars of the Garratt, Kitson-Meyer, Mallet, Fairlie, and, in addition, the Modified Fairlie of the North British Locomotive Company. These various wheel groupings and other characteristics are dealt with in principle and also in detail as applying to specific railways, types of engines and classifications, and a considerable amount of space is devoted to illustrating the engines and portions of their equipment. The author has evidently been at considerable pains to cover the ground thoroughly, and to make the information included in his work as authoritative as possible. The contents of the book are very international in character, and in the main descriptive, and comparative tables of dimensions serve to assist the reader in drawing necessary conclusions between one class of engine and another. The author has been careful to acknowledge the various sources of information from which he has drawn. The earlier chapters deal with the history of the articulated locomotive and the early types which represented the forerunners of the present-day highly specialised articulated locomotive.

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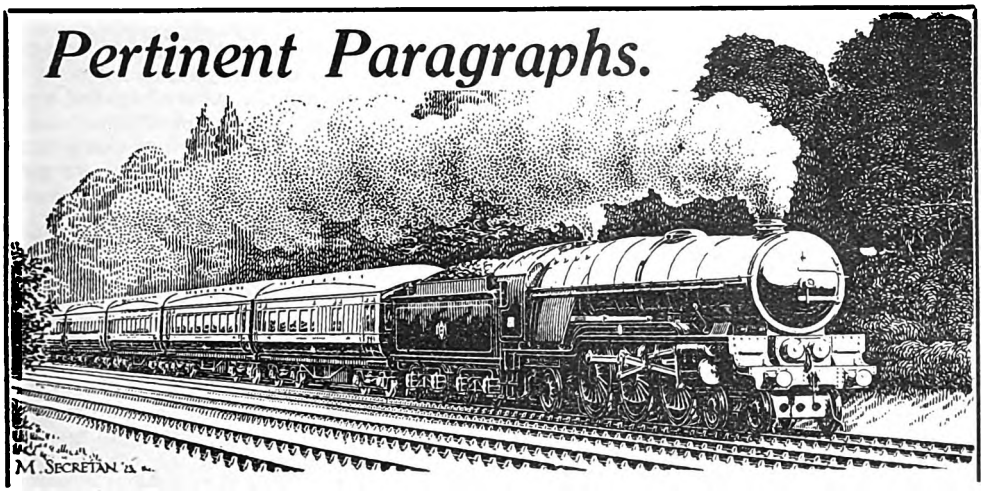
Pertinent Paragraphs.



Heavy-load Express Working on the L.N.E.R.

WE are informed that recently an express train, consisting of 18 corridor and restaurant cars weighing 557 tons, left Newcastle at 4.30 p.m., and, in spite of 2 minutes lost at Peterborough and 2 minutes' delay through signals, reached King's Cross on time (4-6-2 locomotive No. 2552, *Sansavino*). The load was one of the heaviest recorded by the L.N.E.R. on a normal working day. Particulars are also given of the running of a football special from King's Cross to Sheffield recently. 4-6-2 engine No. 2546, *Donovan*, left King's Cross to time at 10.20 a.m., and lost 9 minutes by signals and 2 minutes owing to engineer's check, but regained 7 minutes and arrived only 4 minutes late. On the return journey this engine recovered 7 minutes lost by signals and engineer's check. On the same day, Atlantic engine No. 3300 left King's Cross for Sheffield at 10.30 a.m., and regained 8 minutes which had been lost by signals and engineer's check. This engine was delayed for 18 minutes in all on the return journey, but excellent running resulted in the train arriving at King's Cross to time.

L.B.S.C. Locomotive "Gladstone" to be Preserved.

MR. J. N. MASKELYNE, President of the Stephenson Locomotive Society, informs us that negotiations between the Society and the Southern Railway provide for the preservation and acquisition of William Stroudley's well-known express locomotive *Gladstone*. This engine was the first of the Stroudley front-coupled express class, and was built in 1882. It has remained at work since then until its withdrawal recently, having completed 44 years' service. We understand that it is to be restored to its original condition and repainted in the distinctive yellow colour adopted by Mr. Stroudley; also that arrangements have been made with the L.N.E.R. for the engine to be accommodated in the Railway Museum at York until such time as accommodation can be found at South Kensington Museum in London. The Stephenson Locomotive Society has made itself responsible for the cost of the work of restoring the engine, and has opened a fund to defray the somewhat heavy expenses involved. We are asked to state that anyone who may be interested in the preservation of historic locomotives is invited to contribute to this fund, and any donations received will be acknowledged gratefully by the Society's Treasurer, Mr. F. H. Smith, 159, Albert Road, Croydon, Surrey, to whom all donations should be sent.

The Internal-Combustion Boiler.

CONSIDERABLE interest was aroused at a recent meeting of the Institution of Locomotive Engineers, held in London, when Mr. O. Brunler read a paper entitled "The Internal-Combustion Boiler and its Application to the Locomotive." The principle of the internal-combustion boiler, as described by Mr. Brunler, and for which the hitherto unprecedented efficiency figure of 99 per cent. is claimed, consists in maintaining a flame burning in water in order to produce steam for power or heating purposes. The fuel used is oil, and provided the quantity of air or oxygen supplied is sufficient, complete combustion in water is obtainable. By means of a flame burning in the steam reservoir or in the steam pipe, the steam can be superheated to any required degree. It is claimed that by using the apparatus described a boiler pressure of 170 lb. per sq. in. can be reached within six minutes after the

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generator flame is submerged in the water. The size of the flame, and consequently the quantity of steam produced, can be varied as desired by manipulating one hand wheel only, and once the regulating valve is properly set the combustion is always complete. The steam-gas mixture produced has a low specific heat and extremely high power of expansion. It remains to be proved whether the idea is as practical as it is claimed to be, though it is difficult to see how, even if suitable for steady and continued demands, as in a stationary plant, it will meet the conditions of everyday locomotive service; but the idea is distinctly of interest, and we shall be interested to hear of further stages of development in its application.

Paris-Orleans Railway Electrification.

A FURTHER stage of development has been reached in the extensive electrification scheme of the Paris-Orleans Railway, with the completion of the newly converted main line as far as Vierzon. The formal opening ceremony, by M. Tardieu, Minister of Public Works, took place on December 22. A special train, composed of seven coaches drawn by a 3,000 h.p. electric locomotive, traversed the route from Paris to Vierzon, making stops at Vitry-sur-Seine, where are situated the repair shops, at Orleans, and at Theillay, one of the transformer stations. At Vierzon the company partook of an inaugural banquet, returning to Paris in the evening.

The origin of the project dates back to 1910, when an investigation was made into the possibilities of electric traction for main-line service. Owing to the intervention of the war, further progress was delayed, but in 1919 the earlier plans were completely remodelled and developed on more extensive lines, the main object being the utilisation of the hydraulic power of the Massif Central. The present scheme comprises the electrification of the main line from Paris to Brive, a length of 502 km. (about 312 miles), of which 65 km. (40½ miles) is four-track, and 477 km. (297 miles) double track; and branches from Brétigny to Dourdan, 27 km. (about 17 miles), of double track; from Saint-Sulpice to Gannat, 190 km. (118 miles) of single track; and from Brive to Clermont, 198 km. (123 miles) of single track, making in all 1,576 km. (about 980 miles) of track exclusive of sidings, etc. Earlier in the year the main line was opened to Orleans, and with the new extension to Vierzon, a distance of 127½ miles from Paris, constitutes the longest section of electrified line in France.

U.S. Locomotive Finish.

IT has always been a practice with railway companies in Great Britain to have their locomotives painted and lettered in attractive styles, and no one with knowledge of the subject will be likely to contest the value, from the publicity point of view, of such a step. The economies made necessary during the war period and the difficulties attending locomotive maintenance were responsible for some modification in this direction; but there has since been a revival in part of the generally accepted scheme of smartening the appearance of locomotives by suitable painting and lining out. In America and, generally speaking, on the Continent, other opinions have held, and many an otherwise fine-looking locomotive has had its appearance spoiled by neglect of the painting and lettering scheme. Just recently, however, the Southern Railway of the United States has displaced the sombre black, hitherto the universal garb for locomotives on American Railways, by a livery of Virginia green and gold for its passenger engines, and 23 of the heavy Pacific type just passing into traffic have been painted in these two colours. Apparently, from the particulars available, the scheme has been carried out with great thoroughness, even the wheels being lined out with gold leaf. The driving rods and other running parts are highly polished, adding greatly to the attractive appearance of the locomotives. Names have not actually been applied to the engines, but the tenders of those running between Atlanta and Washington are lettered "Crescent Limited," while others running on another section are similarly inscribed "Queen and Crescent Limited." In addition, the sign of the crescent appears on the painted outer sheathing of the cylinders. Great interest is being evinced as to the effect likely to be produced upon the travelling public by this smartening up of the locomotives

L.M.S. Motor Train Derailment and a Defective Hanger.

ON November 30 last, at Crofton South Junction, Wakefield, L.M.S.R., an L. & Y. type motor train running from Edlington, Wakefield, was derailed and came into slight contact with a freight train standing on the adjoining line. The motor train consisted of engine No. 10602, working in conjunction with motor coach No. 14690. Major Hall's report to the Ministry of Transport in regard to the incident attributes the derailment to the breakage, first, of a brake hanger, and, as a result, of one of the brake pull-rods, the broken member coming in contact with a crossing at the junction. Investigations showed that the hanger had been very ineffectively welded at some time, though as it was from a pool of repaired hangers its history could not be traced in greater detail.

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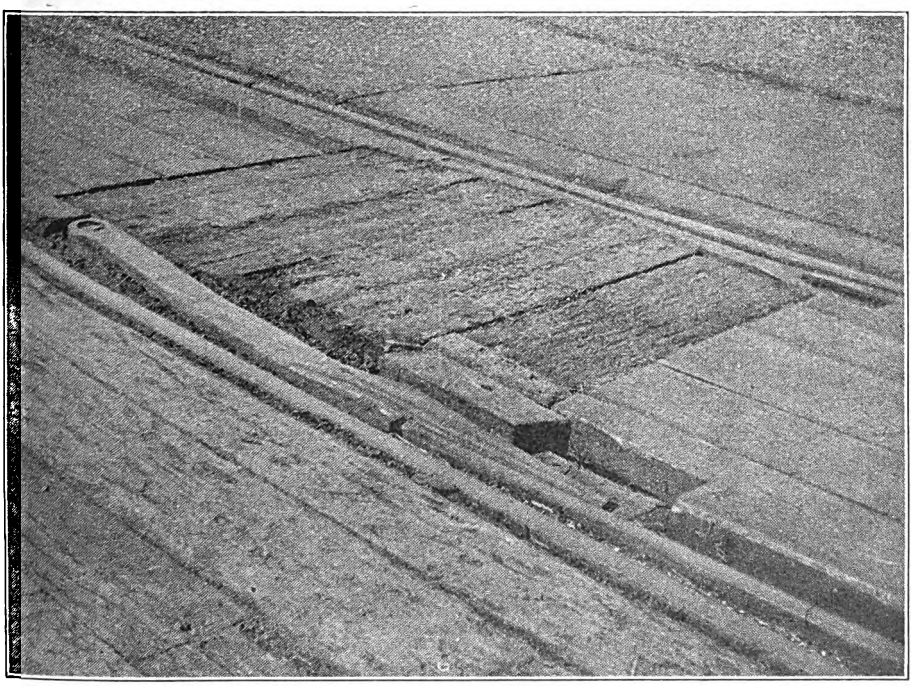
The inspecting officer made certain suggestions as to an alteration in the design of the hanger, though he acknowledged that welding practice had developed since the date when this particular hanger was, presumably, dealt with.

Old and Unusual Points on Fleetwood Wharf.

MR. H. A. ROBINSON, writing from Rock Ferry, sends a photograph and sketch showing an unusual type of points still in use on the wharf at Fleetwood, Lancashire. The photograph, reproduced, shows the unusual design of these points, presumably a relic from early days. The two-point tongues of metal are of a moveable nature, being strongly pivoted at the far end. These act as the "blades," and are moved transversely according to which track is to be used. The "blade," which actually does the guiding of the wheel, and which is on the side to which the vehicle is being sent, is wedged firmly in position by a block of wood lying between the back of the tongue and heavy timber baulks set between rails. The wheel on this side is thus guided "check-rail" fashion. The far side wheel leaves the stock rail for its new track in the same manner that wheels pass from rail to rail at the frog of an ordinary set of points, or at any crossover. The tongue at this side, by removing the block of wood and by kicking with the foot, is placed in the open position. To "move the points," the position of the "blades" is reversed, the open one being pushed over and wedged and the closed one opened. When using the points from a trailing direction it is really only necessary to set the near side tongue, as the flange will ride over the far side one, the insides of the tongues being inclined planes.

As Mr. Robinson points out, it is hardly necessary to say that locomotives do not pass over these arrangements, all the shunting on the wharf being carried out by means of capstans. A large notice, worded in no uncertain terms, forbids enginemen to bring their locomotives any nearer than the entrance to the goods shed. He adds the following comment :—"Despite the apparent drawbacks, it is remarkable the alacrity with which trucks are received, dealt with, and passed back to the main-line sidings. The wharf in question is that from which the packet steamers sail to the Isle of Man and Ireland, and must not be confused with the Wyre docks, which are fitted with all the up-to-date methods of dealing with traffic and lie farther inland."



OLD-TYPE POINTS ON FLEETWOOD WHARF.

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The Farnborough-Fleet Accident on the Southern Railway.

COLONEL SIR J. W. PRINGLE'S report to the Ministry of Transport on the collision between a passenger train and an empty milk churn train, which occurred on November 4 about 6.39 a.m., between Farnborough and Fleet stations, Southern Railway, has been issued. The 5.40 a.m. passenger express train (Waterloo to Bournemouth and Weymouth) was following the 4.15 a.m. (Victoria to Yeovil) empty milk churn train on the down through road between the named stations when it came into collision with the rear end of the churn train, the vehicles of which were stationary, at a point about 530 yards east of Bramshot Halt. The actual speed of the passenger train at the moment of impact appears to have been not less than 40 miles an hour. The driver of the passenger train suffered seriously from burns and scalds, and subsequently died in hospital. The fireman was also injured. Two passengers and three Post Office sorters complained of shock effects. The churn train was drawn by engine No. E775 (4-6-0), and comprised 19 vehicles. Of these 11 were four-wheeled carriage trucks, luggage or milk vans, 5 were six-wheeled vehicles, and 3 were eight-wheeled brake vans. The total weight of the vehicles was 217 tons, the individual weights varying from 9 to 19 tons. The passenger train included engine No. E452 of similar type, and 13 coaching vehicles, aggregating a total weight of 252 tons.

Automatic Signalling Absolved.

THE evidence included consideration of the automatic electro-pneumatic low-pressure signalling in use between Woking and Basingstoke. This was the first method of automatic block signalling adopted in England. The system was first installed between Andover and Grateley in 1901, but is no longer in use on this particular section. It has been in use from Farnborough through Fleet, Winchfield and Hook stations to Barton Mills since 1905. No question seems to have arisen as to the working of the signalling, while it is fairly certain that the signals overrun by the passenger train were operating correctly, though complaints were made as to the blowing of steam from the engine in such a manner as to obscure the view and there was a certain amount of ground mist about. Tracing back to origin, the first element leading up to the accident, though not actually the cause thereof, was the slow running of a light engine, in regard to which the signalman at Farnborough stated that had he known that it would be running so slowly he would have diverted it to the down local line instead of to the down through line. This rendered it necessary to check the milk churn train running on the down through line, producing circumstances which, presumably, accounted for the breaking in two of the milk churn train. The two sections were promptly brought to a stand, and had it not been for the fact that a certain amount of damage was done to the coupling it was assumed that re-connection could have been made in a few minutes. It was for this reason that the guard in charge of the milk churn train did not fulfil the requirements of the rules in regard to telephoning back from the automatic signal bridge nearest to him, though, as the inspecting officer suggests, had he done this at once it is possible that the accident would have been avoided. A certain amount of blame is, therefore, attributed to him, though the primary responsibility is placed upon the driver of the express, who, unfortunately, died subsequently from injuries received when the engine overturned. The evidence of his fireman made it clear that there had been some difficulty in viewing signals during the journey, though other occupations of the fireman relieve him from sharing the driver's responsibility in regard to the particular signals which were overrun. In regard to the fracture of the draw-hook which gave way in the churn train, the inspecting officer states that the surfaces of the fracture show an old flaw of sufficient dimensions to account for the breakage in the circumstances which, presumably occurred, involving a sudden release of the continuous brake in view of adverse signals and the rapid re-application of steam as the signal cleared. In the inspecting officer's opinion, however, the flaw would not have been easy to detect. Apart from placing primary responsibility for the accident upon the deceased driver, and, secondly, upon the failure of the guard of the milk churn train to act entirely in accordance with the rules, no comment is made as to the fracture of the draw hook which gave away, and the only recommendation made is that the accident is regarded as one which would have been prevented had automatic train control been in use in connection with the distant signal at No. 4 signal bridge.

L.N.E.R. "What-it-Costs" Posters.

SOME recent posters which figure on the hoardings of the London and North Eastern Railway Company are concerned with a deeper kind of propaganda than the pictorial advertisements dealing with the attractive resorts on that company's system, and their purpose is clearly to induce all and sundry "furiously to think." They comprise a

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et of four, all simply but effectively coloured, nd are the work of Mr. Austin Cooper. In wo cases they call attention to the effect ast year's trade upheaval had on two f the L.N.E.R.'s most important traffics, vhile the remaining two illustrate the harges the company have to meet all the ime, whether trade is good or bad.

Thus, we have a very striking picture of n idle blast-furnace—one of many served y the L.N.E.R.—with the significant legend ttached, "Normally working 234; working n November, 1926, 4." Then there is a ine indication, in red and black, of a berthed iner, dealing with the quantity of coal hipped on the L.N.E.R., as follows, "May o November, 1925, 21,846,350 tons; May o November, 1926, 348,337 tons"—a tre-

Bern-Lötschberg-Simplon Railway, Captain F. W. S. Jourdain writes that he travelled by this route in October on his way back to India from England, and sends some notes as to his observations, as follow: "Owing to the damage done to the main line between Lausanne and Brigue by storms, the Simplon-Orient express, in which I was travelling, was diverted via Berne, Thun (Thoune) and the Lötschberg tunnel to Brigue and the Simplon tunnel for Milan. As this part of the journey was done in daylight, it was very interesting. The mountain views on both sides of the Lötschberg tunnel were magnificent; but from the railway point of view the most striking thing was that, although the line is single from Thun to Brigue, the high average speed of the electric locomotives

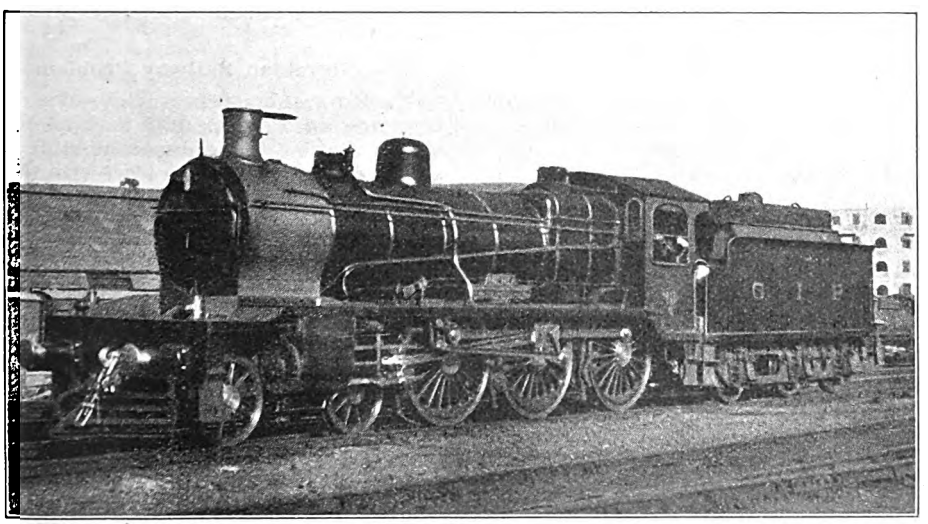

Photo.] [*Capt. F. W. S. Jourdain.*

G.I.P. RAILWAY (INDIA) WAR MEMORIAL LOCOMOTIVE NO. 411 "HERO."

mendous difference which will speak for itself.

The cost of all this to the company is indicated in the remaining posters. One, showing a sleeper, chair and key, stresses the fact that the L.N.E.R. railroad maintenance for one year costs £5,700,000—and that this expense is going on all the time. The fourth of the series is a vigorous depiction of a lever being pulled in a signal-box, with a passing train outside, the wages of signalmen—"going on all the time"—for one year being £1,837,647.

By Electric Train through Switzerland.

REFERRING to an illustration in the October number of an electric locomotive for the

on a ruling gradient of 1 in 37 enabled the extra traffic diverted to this route to be handled without congestion. Heavy passenger trains are usually drawn by two 2-8-2 electric locomotives on the up-hill sections, and these will, presumably, now be replaced by one of the 2-6-0 + 0-6-2 type as they become available."

Further Travel Observations.

CAPTAIN JOURDAIN also sends some notes as to further stages of his journey, and experiences on his arrival back in India. He continues: "Travelling through Northern Italy by the same train to Trieste, it was noticeable that the majority of Italian passenger locomotives are of the 2-6-0 or

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2-6-2 types. I did not see any six-coupled passenger engines with leading four-wheeled bogies (excluding the 4-6-0 tanks, which always run in reverse with a water-truck attached in rear), and have previously noticed the same feature in Austrian and Czecho-Slovakian engines. On the ex-Austrian section of the Italian railways (near Trieste) the locomotives appear to be exclusively those taken over from Austria at the end of the war. On arrival in India I was given the opportunity of riding on the footplate of the engine of the Bombay-Calcutta Mail (via Jubbulpore) between Kalzan and Kasara, at the foot of the Ghats. This is on the G.I.P.R. North-East main line, and the locomotive was 4-6-0 No. 411, *Hero*, a photograph of which is reproduced. This is the only named engine I have seen in India, and it is the G.I.P.R. War Memorial engine. The full inscription is as follows :—

IN MEMORY OF G.I.P. RAILWAY EMPLOYEES WHO GAVE THEIR LIVES IN THE GREAT WAR. 1914–1918.

This, of course, is similar to the 'War Memorial' locomotives on home railways, but is rather striking for India. No. 411 is oil-fired, and in consequence the cab is kept spotlessly clean. The driver told me that he is always kept to the same engine, and has driven the Prince of Wales, the Viceroy, and other distinguished travellers over the G.I.P.R. with this locomotive. The journey from Kalyan to Kasara was done on a moonlight night, and, apart from the working of the engine on the gradients, it was very interesting to see the country through which the line goes. This includes some long stretches of jungle and at least one panther was seen on the up line."

New Platform, Bristol and Portishead Line, G.W.R.

On Thursday, December 23, 1926, the Great Western Railway opened a new platform which has been erected amongst exceptionally pretty sylvan surroundings, close to Ham Green Hospital, near Pill. A pathway leads from the platform to the hospital entrance, and doctors, nurses and visitors travelling to and from the Bristol stations will find this platform most convenient. All Portishead line trains call to set down or pick up passengers, most of whom are expected to hold return tickets to Ham Green and back, and staff are not employed at the place to commence with. There is a Sunday as well as a week-day service, and the inhabitants of Ham Green, which is a growing neighbourhood, will also, no doubt, benefit from this new railway venture. Cheap return tickets to Ham Green are being advertised, and efforts are made to keep the passengers for and from the place in one coach on the train, to expedite the working.

The Great Western Railway have lately done a good deal in extending facilities of this kind, and the results are showing that they are appreciated. Similar platforms have recently been introduced in the Bristol area at Long Ashton, Filton and Christian Malford; others are also under consideration.

On Sundays through trains leave Bristol (Stapleton Road) at 2 p.m. and Lawrence Hill at 2.5 p.m. for Ham Green, and Ham Green at 4.39 p.m. for Lawrence Hill and Bristol (Stapleton Road).

Czecho-Slovakian Railway Problems.

M. Riha, Minister of Railways, in an interview in Prague, said that as regards administration the commercialised Czecho-slovak railways were on a level with those in other countries. Both from the technical and administrative point of view all improvements introduced in Europe or other parts of the world were submitted to a close examination in Czecho-slovakia; as many innovations as possible were adopted and transformed according to the requirements of Czecho-slovak railway traffic. It was not to be forgotten, moreover, in speaking of railway matters, that conditions in Czecho-slovakia were different from those in other countries and in many ways much less favourable. Abroad, for instance, the construction of new lines depended entirely on the returns expected from these lines and was not hampered by a large number of difficulties such as those against which the Czecho-slovak railway administration had to struggle.

In particular, the hilly nature of Czecho-slovakia required very powerful locomotives; the great length from west to east of the Czecho-slovak territory rendered a very delicate tariff policy necessary; the particular grouping of the industrial and commercial centres required that the railways should permit of easy access both to international markets and export countries; and the seasonal truck requirements of industry meant that a large fleet must be maintained which could only be completely utilised during a third of the year, while during the other two-thirds of the year the expenses of upkeep, which were large, continued. All these questions, which had to be considered separately, exercised a great influence on Czecho-slovakia's railway policy.

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Traffic on the Edgware Extension, L.E.R.

IT was in June, 1922, that the President of the Board of Trade cut the first sod on the extension from Golders Green to Edgware. The line took 1¾ years to build and was opened in two sections—from Golders Green to Hendon Central, in November, 1923, and from Hendon to Edgware in August, 1924. Traffics on the new line were disappointing at first, but this was not altogether unexpected, for, despite the promise of a tube railway, very few houses had been erected while it was actually being constructed. The comparative figures given below illustrate, however, that it is only a question of time before the five stations on the new extension are handling traffics of similar, if not greater, magnitudes than at many old-established stations on the " Underground " system.

In 1924, five million passengers travelled on the Edgware extension, while for 1926 the figure was nearer eight and a-half millions. Reviewing the stations separately, the following figures show the remarkable growth of traffic which has taken place since 1924 :—

	1924. Passengers per month.	1926. Passengers per month.
Brent	83,000	119,000
Hendon	140,000	200,000
Colindale	100,000	177,000
Burnt Oak	15,000	37,000
Edgware	75,000	171,000

Housing developments along the new line are now distinctly encouraging. Colindale is rapidly becoming a big industrial centre, 4,000 workpeople using the station daily. At Burnt Oak, a housing estate comprising 3,000 dwellings is well advanced. Occupation will commence early this year. The lot of the pioneer has ever been a hard one, the almost prohibitive price of land in the neighbourhood of the new extension having retarded the normal developments in traffic which might have otherwise taken place. The Edgware line stations are all within half an hour's run of Charing Cross—journeys which formerly took anything up to two hours, and there are 160 trains running in each direction daily, which service is to be increased the moment an increase is warranted.

Banking at Leeds.

MR. GERALD W. SPINK writes, in reference to a reply in a recent issue dealing with banking, pointing out that he has often seen trains thus assisted out of Leeds (Central) station, on the G.N. section of the L.N.E.R. He adds some further remarks as to interesting railway observations in the district, which may be quoted as follow :—" On several occasions I have watched the departure of the north and south-bound Pullmans, and only on one or two occasions did such a train leave without banking assistance. The reason in one case was that the Pullman, brought in from London by G.C. 4-6-0 *Lloyd George*, had two additional cars attached, conveying H.M. The Queen and attendants, and the train was taken forward to Harrogate by *two* North Eastern ' Z ' ' Atlantics.' This was in August, 1923. On December 24, 1923, the Newcastle-bound Pullman was brought in from London by a G.N. ' Atlantic,' piloting a G.N. 4-4-0. On this occasion the train was actually ' banked ' by two engines, which, when their ' banking' duly was finished, remained with a solitary luggage van, which at that time was attached to or detached from the Pullman, as the case might be, at Leeds. I have noticed the Pullman being banked as recently as July, 1926. Sometimes the assisting engine helps in the rear only as far as the platform end, but on other occasions it gives further assistance over the formidable gradient beyond the platform. On the first public run of the Pullman (apart from the private inaugural trip), the G.N. ' Atlantic ' was unable to start, and a special signal had to be given to the Newcastle ' Z ' driver to give the assistance which is now, apparently, the rule, and, of course, given immediately the ' banking ' driver receives the necessary ' crow.' In the afternoon of the same day the Newcastle North Eastern ' Z ' hauled the north-bound train away without assistance and without ' slipping,' but it appears to be the rule to bank the Pullman now on all occasions, as also other London-Harrogate trains."

Fastest Runs on South African Railways.

IN view of references in the October, 1926, number to the fastest booked start-to-stop run on railways in the Colonies, Dominions, &c., Mr. E. Egleton, writing from Seapoint, Cape Town, sends the following particulars of some of the more notable trains in operation on the South African Government Railways :—

Johannesburg to Cape Town, 956 miles, per " Union Limited " (several stops), in 28 hrs. 23 mins., that is, at 33·6 m.p.h. for the whole journey.

Cape Town to Johannesburg, 956 miles, " Union Express " (several stops), in 29 hrs. 45 mins., which is at the rate of 32·1 m.p.h. throughout. The foregoing trains both run twice weekly.

Johannesburg to Pretoria, 45 miles, in 1 hr. 15 mins. (two stops), which is 36 m.p.h. The service in the opposite direction is the same, and there are two trains daily at this speed in each direction.

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On these trains the non-stop portion between Germiston and Pretoria and vice versa, 36 miles, is run in 58 mins., which is at the rate of 37·24 m.p.h., and may be regarded as the fastest start-to-stop run on the South African Railways. Another fast service, run several times daily, is Cape Town to Muizenberg and vice versa, 15 miles, in 27 mins., which is at the rate of 33·3 m.p.h. The average speed for ordinary long-distance runs is from 20 to 27 m.p.h. for the whole journey. The latter speed is only reached on the Cape Town-Durban and Durban-Cape Town twice-weekly services, which connect at Kimberley with the "Union" trains already mentioned. The times are: Cape Town to Durban, 1,253 miles, in 46 hrs. 10 mins., and 46 hrs. 43 mins. in the reverse direction.

Traffic Statistics at Big Stations.

MR. EGLETON suggests that it would be useful if traffic statistics in regard to the work at big stations could be stated upon a uniform basis. This is a point which we have endeavoured to consider, though frequently the information given has to be accepted in the form in which it is supplied. To indicate his point, Mr. Egleton remarks: "For example, the S.A.R. carry, say, 75 millions a year, but this includes all the journeys made by season-ticket holders. The totals of the English railways, on the other hand, apparently do not include season-ticket journeys, the number issued only being given." We may point out that information of this character usually contains an explanation as to whether it does or does not include the journeys made by season-ticket holders. When it is desired to take the latter factor into account, a usual method is to adopt the view that the average season ticket is used for one double journey daily on 300 days in the year, so that, if the number of season tickets is stated, it is an easy matter to add the number thus resulting to the total of ordinary ticket travellers. The difficulty is that, in the case of a railway having more than one terminal station, it generally happens that a given season ticket holder will not always use the same station, so that, if one station only is in question, to include him every time may give a wrong impression. It is for this and other reasons that the season ticket traffic is usually stated separately, in that only on the basis of actual counts of passengers can the real total be obtained.

"The Geelong Flier."

As in many other countries, road transport has entered into strong competition with the railways of Victoria, Australia—at least on the principal routes—and, although in some cases the railway administrations have developed competitive road motor services, these have not always had the desired effect. Competition by road became very pronounced between Melbourne and Geelong, the latter being a city situated some 45 miles distant from Melbourne, and, in order to meet this, the Victorian Railways Commissioners introduced a new train styled the "Geelong Flier," this being the first Victorian train to have a distinctive name. It commenced to run on May 3 of 1926, and is timed to do the journey of 45 miles in 70 minutes, leaving Flinders Street at 9 a.m. and arriving at Geelong at 10.10 a.m., the return times being 4 p.m. from Geelong and 5.11 p.m. at Melbourne. The train comprises four bogie corridor cars and a six-wheel van, and is usually hauled by an "A.2" class engine, which is similar to that used on the Melbourne to Albury Interstate express. While the time of 70 minutes for the 45 miles hardly seems to suggest that the term "Flier" is strictly applicable, we understand that, following alterations to the signalling system, it is intended to reduce the travel time to one hour, this giving an average of 45 m.p.h., which, for Australia, is exceedingly good. As in other directions, the Victorian Railways Commissioners are taking time by the forelock. As they say in a leaflet intimating the introduction of the new express train, "The Railway is the Best Way," and their aim is "On Time all the Time." They frankly admit in the leaflet that the special service by the "Geelong Flier" has been inaugurated in order to conserve traffic for the railways, and that experience in other countries has proved that the naming of trains has appealed to the public imagination. The stock comprising the train was built at the Newport Workshops in Victoria.

Locomotive Working in Scotland.

REFERRING to the remarks made in the January issue on the subject of the working of the small Manson 4-4-0 locomotives on the Glasgow and Greenock (Prince's Pier) route of the L.M.S.R., Mr. A. M. Reilly writes as follows:—

"The engines in question have been, and, I am sure, are still great favourites with the drivers on the Glasgow & South Western Railway, now, of course, a section of the L.M.S. They do, even up to the present, a considerable amount of fast train working on this section, those engaged on the Ayrshire Coast Lines having larger driving wheels, viz., 7 ft., as against the 6-ft. 1-in. of the Greenock engines. On several occasions last summer, I saw 'Manson Bogies' at the head of Ayrshire coastal expresses

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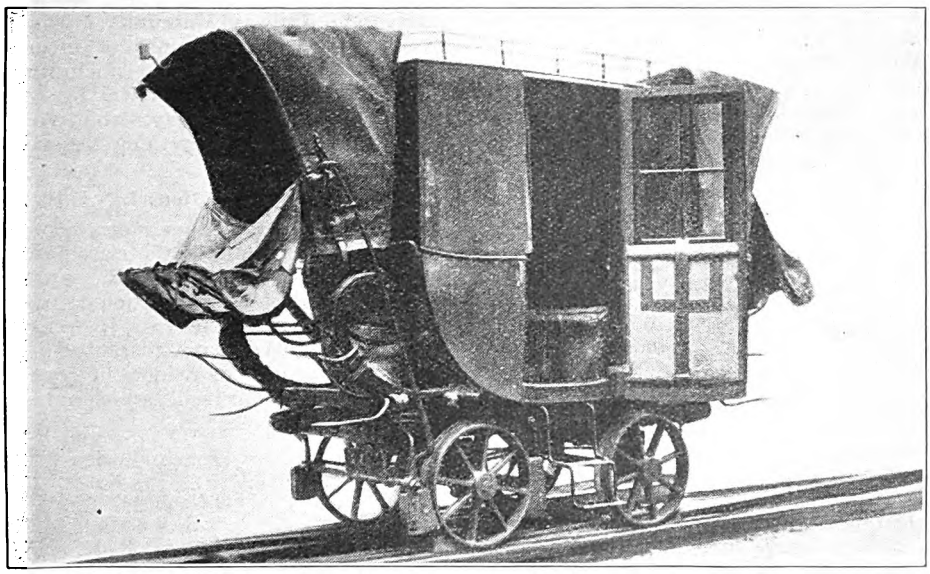
which for weight would have been no disgrace to the 4-6-4 tanks. And I am sure they (the Manson Bogies) kept time on their trains. While I would not like to compare these engines to the 'George the Fifth' class of the late L. & N.W.R., with their, at one time, rostered tare loads up to 420 tons, yet they compare in the respect that they have boilers which steam well under any condition, and were, prior to the amalgamation, to the G. & S.W.R., what the 'Georges' were to the L. & N.W.R.

"When in Carlisle Station last autumn, I saw the afternoon restaurant-car train from Stranraer arrive, the engine being one of the ubiquitous 'Manson Bogies.' The train, however, went out again at, I suppose, 4.15, behind a Caledonian 'Pickersgill' 4-4-0. Returning to the Greenock route, it should be pointed out, I think, that the rolling-stock, although reasonably comfortable, is of an old pattern, which probably the railway company are loath to replace with a more modern design, owing to the desire to keep down the weight of the trains. Ultimately, they will have to do so, however, and then I am afraid it will be goodbye to the old 'Manson Bogies' on this route. Prior to the war, the late Mr. Drummond introduced a number of large 4-4-0 locomotives with 6-ft. driving wheels on the Glasgow & Greenock Line, but these were withdrawn, after a short spell, to the Ayrshire Routes. Perhaps when new, and heavier carriages find their way on to the route concerned, the 'Drummond' engines will be returned to do the work for which, I understand, they were originally built. Personally, I think the route an ideal one for 4-6-4 or 4-6-2 tank engines, provided the loads made a more powerful type of engine necessary.

"In conclusion, I would like to mention that the 4-6-0 engines, once sacred to the Carlisle route, are, since the advent of the 'compounds,' finding themselves on all sorts of miscellaneous duties, particularly on the Ayrshire Lines, such as expresses, semi-fasts, fast goods, and even, let it be whispered, locals. I am surprised that the L.M.S. do not rebuild this type with superheaters. I believe, if so rebuilt, they would make excellent engines. Old No. 129 had a superheater, and it was one of the best locomotives the G. & S.W. ever possessed. It also had a Weir feed-water heater, but this was removed latterly."



AN EARLY AUSTRIAN RAILWAY COACH.

Notes on Austrian Railways.

LIEUT. H. TUDOR WILLIAMS, R.N.R., sends some interesting particulars based upon observations during a recent stay in Austria. He also sends an illustration of an original Austrian railway coach, now preserved in the Railway Museum at Vienna. This is reproduced, as it will no doubt interest many of our readers, while his comments upon Austrian railways may be quoted:—

"The State Railways in Austria are showing many improvements since the war

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period, after which they were at very low ebb, the rolling-stock and many of their finest locomotives being handed over to Italy. The Innsbruck-Brenner section can show to-day quite a number of trains which make good connections between Germany and Italy. The line starting at Innsbruck at 573 m. rises in its course of 25 miles to 1,374 m. at Brenner, an ascent of some 2,600 ft. To gain height without corkscrew tunnels a large horseshoe curve (this rises 300 ft. in 2½ miles) is made at St. Judock, a small and pretty village, which has, I suppose, the smallest stations on the line, only the 'Personnen' (slow) trains stopping there. The Italians now have possession of the station at Brenner (their frontier posts being about 500 yards north of the station). There is a fine monument recording the opening of the line in 1865. There is a large fruit traffic now from Italy, and trains of 40 and 50 box cars are worked with a 2-10-0 in front and generally one of the curious old woodburning 2-8-0's, with spark arrester chimney. I noticed the date on one—1885—and they seem to do good service still, helping, as they do at times, the through trains from Berlin and Munich that come into Innsbruck. These trains are generally heavy during August and September, consisting of 10 to 12 bogie coaches—not an easy load for two engines to work, and it takes heavy firing to do this. The tunnels, eight or nine in number, are named and numbered. The freight trains of 40 or more box cars have two locomotives, one always being a pusher, the latter in most cases having a box car behind.

"During August the line was being relaid, and it was interesting to notice the ease and quickness with which the spikes came from the sleepers. I did not notice any rust on the spikes; they are three in number on each side of the sleeper (two outside and one inside the rail), and the rail rests on a small iron plate which has three holes to take the spikes. The signalling 'seems' much like our railways, with home and distant. The former—iron posts painted red and white—show the arm at 45 deg. for clear, white at night, and for danger, as with us, at 90 deg. and red. The distant, placed lower, has a square disc painted green and two V's in white. It shows a green light when on and is horizontal, and shows white when off. At the foot of the distant signal there is always a square board, painted the same colour as the signal and rather larger. This, it would seem, shows during the day the position of the signal post to the driver. The distant signal is very clear to pick up day and night.

"At large stations such as Innsbruck and Vienna there were signals showing a purple light at night and a diamond board during day when on. Considering the distance between Vienna and Innsbruck, which is some 567 km., the 'Personnen' does not do badly in leaving West Bahnhof, Vienna, at 7.40 p.m. and getting into Innsbruck at 9.30 next morning, with 28 stops during the trip. I found the third-class comfortable and clean, having the carriage to myself during the whole trip. There is ample room for one's luggage on the two racks, and, with a rug, a comfortable sleep can be secured. The cost of a single ticket between Vienna and Innsbruck is 72 schillings—that is 14s. for the 354 miles, which is not excessive. At Vienna there is a most interesting Railway Museum. I was taken over it, and many points of interest in bridging, signals, coaches (including the old Royal one) were shown by an old signalman of the railway, who was very pleased to explain 'anything' there."

Locomotive Classification, L.N.E.R.

NUMEROUS readers have indicated a desire to obtain particulars of the classification of locomotives on the L.N.E.R., and as a basis we give below information compiled by Messrs. P. A. Hargreaves, J. Ashby and H. Davison. We do not guarantee accuracy but the assistance of readers in completing or correcting the list will be welcomed.

Class.	Type.	Section.	Sample Engine No.	Old Class Letter.
A1 ..	4-6-2	G.N. & L.N.E.	4470, 2544	—
A2 ..	4-6-2	N.E.	2400	—
A6 ..	4-6-2T	N.E.	695	W.
A7 ..	4-6-2T	N.E.	1113	Y.
B4 ..	4-6-0	G.C.	6100	—
B12 ..	4-6-0	G.E.	8530	—
B13 ..	4-6-0	N.E.	2006	S.
B14 ..	4-6-0	N.E.	2111	S1.
B15 ..	4-6-0	N.E.	815	S2.
B16 ..	4-6-0	N.E.	2370	S3.
C1 ..	4-4-2	G.N.	4400	—
C2 ..	4-4-2	G.N.	3257	—
C6 ..	4-4-2	N.E.	532 and 696	V and V1.
C7 ..	4-4-2	N.E.	2207	Z.
C8 ..	4-4-2	N.E.	730	4.C.C.
D4 ..	4-4-0	G.N.	—	—
D13 ..	4-4-0	G.E.	—	—
D15 ..	4-4-0	G.E.	—	—
D17 ..	4-4-0	N.E.	355	Q; M.
D18 ..	4-4-0	N.E.	1869	Q.1.
D19 ..	4-4-0	N.E.	1619	—
D20 ..	4-4-0	N.E.	2016	R.
D21 ..	4-4-0	N.E.	1237	R1.
D22 ..	4-4-0	N.E.	1324	F.
D23 ..	4-4-0	N.E.	—	G.
D24 ..	4-4-0	H. & B.	—	J.

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lass.	Type.	Section.	Sample Engine No.	Old Class Letter.
4 ..	2-4-0	G.E.	7502	—
5 ..	2-4-0	N.E.	1463	—
8 ..	2-4-2T	N.E.	423	A.
5 ..	0-4-4T	N.E.	2085	O.
6 ..	0-4-4T	N.E.	615	B.T.P.
1 ..	4-4-4T	N.E.	1522	D.
2 ..	0-6-0	G.N.	3331	—
4 ..	0-6-0	G.N.	3071	—
21 ..	0-6-0	N.E.	313	C.
23 ..	0-6-0	H. & B.	—	B.
24 ..	0-6-0	N.E.	—	P.
25 ..	0-6-0	N.E.	—	P1.
26 ..	0-6-0	N.E.	—	P2.
27 ..	0-6-0	N.E.	—	P3.
28 ..	0-6-0	N.E.	—	L & L1.
35 ..	0-6-0	N.B.	9188	—
38 ..	0-6-0	L.N.E.	1410	—
39 ..	0-6-0	L.N.E.	1482	—
71 ..	0-6-0T	N.E.	54	E.
72 ..	0-6-0T	N.E.	622	E1.
73 ..	0-6-0T	N.E.	—	2.
74 ..	0-6-0T	N.E.	—	8.
7 ..	0-6-2T	L.N.E.	966	—
5 ..	0-8-0	N.E.	—	T. & T1.
6 ..	0-8-0	N.E.	2266	T2.
7 ..	0-8-0	N.E.	901	T3.
10 ..	0-8-0	H. & B.	—	A.
1 ..	2-2-4T	N.E.	66	—

the large towns in the provinces on the day of publication, an achievement which was dependent upon transport facilities, and, acceding to their request, a special express train was held in readiness to leave Buenos Aires for Rosario at 3.39 a.m. on the morning of February 11, the run of 188 miles being effected in the record time of 3 hr. 21 min., after slowing down en route to enable supplies of the newspaper to be dropped at the towns of Campana, Zárate, Baradero, San Pedro and San Nicolás. The train arrived at Rosario at 7 a.m., which enabled consignments of the newspaper to be forwarded by connecting trains so as to reach the cities of Santa Fé, Côrdoba and Rio Cuarto, which are situated 300 miles, 434 miles and 381 miles respectively from Buenos Aires in the afternoon of the same day."

Another Notable Run on the Northern Railway of France.

MR. J. P. PEARSON sends particulars of a recent run of a Northern Railway of France express on which he travelled when returning from Italy. He regards this performance as more remarkable than any previously recorded in THE RAILWAY MAGAZINE, the

Kils.		Time taken to Pass.	Previous Records as noted on p. 289, April RAILWAY MAGAZINE (best of a number of Runs).	Kilometre times on this Run of October 29.
	Paris—	Min. sec.	Min. sec.	Posts 8 to 27—
6·1	St. Denis	5 54	6 3	66 sec. (two), 70 (two), 73 (two), 73 (two), 112 (three), 74 (two), 72 (two), 75 (two), and 75 (two). Notice the very slight drop in speed in the distance from post 12 to the top.
0·1	Pierrefitte.. ..	2 18	2 25	
4·8	Villiers-le-Bel ..	2 45	3 3	
9·5	Goussainville ..	2 56	3 15	
3·6	Louvres	2 28	2 34	
9·7	Survilliers.. ..	3 44	4 1	
		20 5	21 21	

High Speed Special Train Working in the Argentine.

MR. E. A. GURNEY-SMITH directs attention to a reference in the latest report of the Central Argentine Railway to an example of special running on that line. The matter is thus explained: "In February, 1926, the Spanish aviator, Commander Ramon Franco flew by hydroplane across the Atlantic from Spain to Argentina. The feat aroused the greatest enthusiasm amongst the population of this and other South American countries, and *La Nacion* published a special edition on the day following the aviator's arrival. It was the wish of the publishers that the special issue should reach

figures constituting, in his experience, the only instance yet noted of a train of over 500 tons not falling below 60 m.p.h. on a long continuous bank of 1 in 200. The run was made on October 29, the engine being 3.1224 and the load 430 tons tare, 460 tons gross. He gives the above particulars of the run as between Paris and Survilliers.

"A further remarkable bit of work was the ascent of the Dannes-Camiers bank, with the last 2 km. only taking 42 seconds each. Still more wonderful was the ascent, after a slack at the foot of the bank, to Caffiers, where our final 2 km., on this very severe bank at 1 in 125, only took

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48 seconds each. This, like the ascent to Survilliers is, I believe, a record. The driver was not aware he was being timed."

Notes on Danish Railways.

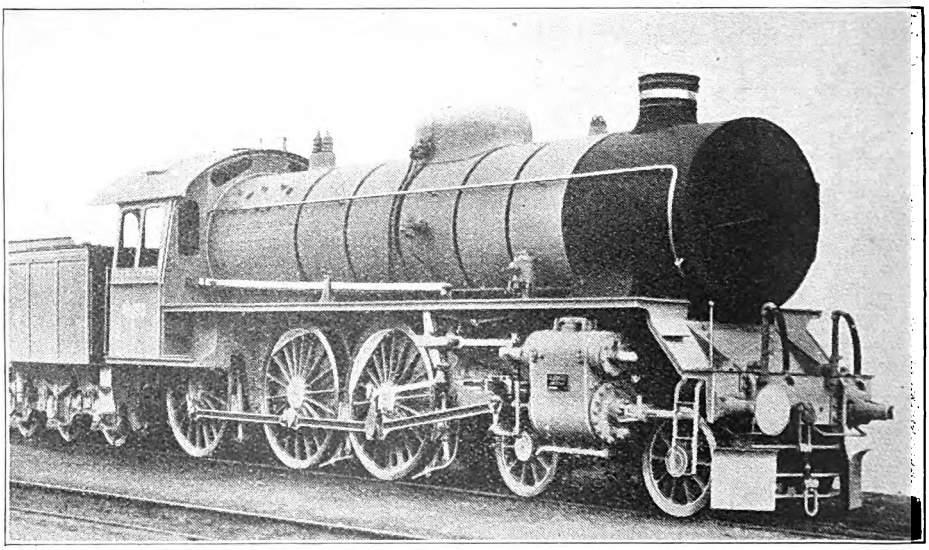
MR. E. J. C. MOORSE sends a few notes based upon observations on Danish railways, together with several photographs, one of which is reproduced. His remarks may be quoted as follows :—

Denmark is a delightful little country, and it provides one or two novelties for the railway enthusiast. There are some 28 systems, the largest and most important of which is the Danske Statsbanor, or Danish State Railway. The State lines connect up all the larger cities and towns, while the private railways bring places of lesser importance into touch with the main railway system. On the State railway there are some very nice trains, one of the best of these is the express connection between Esbjerg, the North Sea port, and Copenhagen, the Capital. The train is very comfortable, and covers the distance in good time. From Esbjerg the train takes passengers to Fredericia on the eastern coast of the mainland, Jutland, and from thence a train ferry takes first and second-class carriages from the train, and third-class passengers on foot, across to Middlefart, on the coast of the island of Fünen. Another train is made up here which continues the journey as far as Nyborg. An hour and a half's train ferry journey takes the passengers across to Korsör, on the island of Sjaelland, and then the third train portion of the journey commences, Copenhagen being reached some eight and a-half hours after leaving Esbjerg. Several large cities are passed on the way, the chief among which is Roskilde, and a glimpse of the beautiful cathedral, with its two slender spires, is obtained from the train.

Rolling Stock and Locomotives.

ON the whole, trains in Denmark are on the slow side, but they are all very comfortable. Third-class compartment seats are of wood, shaped to fit the body. All trains are of the side corridor type, and have iron platforms at the ends of the carriages, with little gates and flights of steps leading down to the station platforms. Instead of the usual three windows to each compartment, in Denmark there are large single sheets of glass, that enable the traveller to get a splendid vista of the passing country. Doors are at the ends of the carriages.

Locomotives, which seem very serviceable machines, are painted black with a double red line, and on the State engines there is a band of



4–6–0 LOCOMOTIVE, DANISH STATE RAILWAYS.

the national colours, red, white, red, round the funnels. Carriages are mostly dark crimson, lined and lettered in yellow. All have the Crown and D. S. B. painted on. The larger engines are mostly of 4-6-0 or 2-8-0 types. Carriages are wider than their English counterparts, seating five people in addition to the corridor. One of the curiosities of Danish railways are the old double-decker carriages, which have a flight of steps at each end to enable passengers to reach the upper "storey." A number of these quaint carriages are usually to be seen outside Copenhagen main station.

Another peculiar thing to English eyes is the method of starting a train from a station. A station official, probably the station master, with white trousers and shoes, goes to a large green lamp and switches it on, keeping the green light showing till the train is well away, and then switching it off again. Signals are of many types, most of the semaphores being slotted all

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he way along, as is common on the Continent. The Aga flashing signal lamp is largely used. On country lines the approach to a station is notified to drivers by boards being erected at the side of the line. At some distance from the station a post is fixed, with three rectangular boards on it in a sloping position. A short distance further on the pole has two boards, and then close in one board is displayed. Motor trains are used in many parts of the country, and also Sentinel steam trains. Stations are important buildings in Denmark, though not many of the platforms (here about 10 in. high) are covered. They are built on generous lines, and are usually handsome erections. The station names are on boards at each end of the station, put up at right angles to the train, so that the name can be read more easily than is the case in some English stations. The distance to the next station either way is put up on the station buildings, with the names of those stations. Wagons look very uniform, there being no privately-owned ones. Covered vans for perishable goods, such as meat, etc., are the usual white.

The "Underground" in 1926.

THE following particulars outline principal "Underground" developments in 1926 on the railway side, and indicate the "provision" for 1927.

The outstanding contributions of the year 1926 were undoubtedly the 5-mile extension of the City Line from Clapham Common to Morden, and the linking up of the Hampstead and City Railway between Charing Cross and Kennington. The single track between Hounslow Central and Hounslow West was doubled for a total length of about 1 mile, and a new island platform was built at the latter station. The service on this line was increased from a 10-min. to a 7½-min. in December last. Work was begun on a new short length of tube connecting the Piccadilly and the City Lines at King's Cross. This, however, will not be employed for passenger traffic, but has been designed to enable the rolling-stock of the City Line to reach the tracks of the Piccadilly Line and so reach Acton Town for overhaul.

Blackfriars, Temple, Holborn, Bond Street, Victoria and Waterloo stations all received reconstruction attention during 1926, and new and more commodious stations will be available for the public as a result. Work on the new station at Piccadilly Circus has progressed favourably, though the preliminary work of forming a pipe subway for the housing of the multitudinous mains—electric, water, &c.—naturally retards, to some extent, work on the station itself. The new subway, however, is nearly complete, and work will begin very shortly on the formation of the large booking-hall, which will be encompassed by a subway giving connections with all parts of the Circus. Pilot tunnels for the 11 moving stairways have been constructed, and work is now progressing on the enlargement of these. Escalators superseded lifts at Trafalgar Square and Bond Street stations, and an additional moving stairway of faster type was also introduced at Charing Cross. There are now 61 escalators in daily service on the "Underground." Higher-speeded lifts were introduced at Leicester Square and Holborn with beneficial results.

Improved train services were introduced on all lines. The year saw a continuance of the experiments which the company are making to evolve the perfect ticket machine. A machine was introduced which issued tickets specially printed for the passenger on demand, and there are now 19 machines of this type at various stations, and also 20 change-giving machines of a new type. Passimeters have superseded the old type of booking office at eight stations, 14 passimeter booths being installed during 1926. Altogether 194 new cars were introduced on the railways in 1926. These were mostly required for the Morden line service. A general scheme for remodelling the existing C.L.R. rolling-stock was commenced, and a few of the reconditioned cars, fitted with pneumatically-controlled doors, more comfortable seats and other improvements, comprised in the latest standard type of car, are now running. The plant at Lots Road power house was considerably increased during the year, so as to provide for the closer services operated. 1926 also saw the appointment of guides at Charing Cross; new types of direction signs for the convenience of passengers; platform indicators and more weekly season tickets.

And in 1927.

WHILE no new "Underground" railway will be opened, 1927 will be an important year in the annals of London's transport history. Many of the new improvements upon which work is now proceeding will be completed. Bond Street, Blackfriars and Temple stations will be finished early in the year, and at an early date passimeters will be installed at Putney Bridge, Baker Street, Hammersmith, West Kensington and Finsbury Park stations. Three more escalators will be installed at Charing Cross station, as part of the general remodelling of this station. Escalators will also appear at Sloane Square, Camden Town, Highgate and Waterloo. There will be 72 escalators on the "Underground" by the end of 1927.

A general extension scheme of the Acton works will be completed during 1927, and another 25 new cars will be put into service. Work will be commenced on a scheme for improving St. James's Park station, and also

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on a new office building which will be used in part for the housing of the "Underground" administrative staff, now scattered in various parts of London. 1927 will also see the completion of all 300 remodelled cars on the C.L.R. and Hampstead lines. Additional slot ticket machines, change-giving machines, and ticket-printing devices will appear during 1927.

L.M.S.R. Locomotive Programme for 1927.

THE London Midland and Scottish Railway programme provides for the building this year of 473 new engines, or over one engine a day. They comprise the following:—

50 4-6-0 locomotives of a new design intended for dealing with heavy fast passenger traffic between Euston and Scotland.

176 0-6-0 standard freight tender engines for goods and mineral traffic all over the L.M.S. system.

25 2-6-4 tank engines of a new design for fast suburban passenger work on various parts of the system.

87 2-6-0 mixed-traffic engines designed specially for working fast goods trains and, during the summer, excursion passenger trains.

50 4-4-0 standard superheated compound engines for use with the more important main-line express passenger services.

50 4-4-0 passenger tender engines for lighter main-line trains.

22 0-6-0 standard shunting and general utility goods engines for use on all kinds of shunting and lighter goods traffic up and down the whole of the line.

10 4-4-2 Tilbury tank engines.

3 Garratt engines for use on the heavy mineral traffic between Toton and London.

American Praise for British Railways.

WRITING recently in *The Saturday Evening Post*, Mr. Edward Hungerford compares the facilities and comforts of railway travelling in Great Britain with those of America. "The British railways," he says, "stand in a class by themselves. . . . In the passenger services they render, the railways of Great Britain are, in many respects, without a superior or an equal in the world. For cleanliness, for regularity, for speed and for comfort, they stand unsurpassed. This is a hard thing for an American to set down on paper—one who knows full well the sheer magnificence and the creature comforts of such trains as the *Sunset*, the *Golden State*, the *Capitol*, and the *Knickerbocker*—many others, too. . . What I mean when I make this statement about the British passenger train is precisely this: If you will go to the nearest railway station over there and take the first passenger train that comes along, you will probably get a better, a swifter, and more comfortable train than if you went to one of our railroad stations here in the United States and took the first average train that came along.

"The British carriages are small—the trains are small, but size does not necessarily mean speed, and some of the British trains to-day are among the fastest in all the world. They get away quickly and easily—there is no jerking or yanking of the cars whatsoever—and soon they are travelling at sixty—seventy—eighty miles an hour.

"Since the war the British have busied themselves with the refinement and development of their moderate-sized locomotives. An engine like the *Caerphilly Castle* of the Great Western Railway may weigh less than 120 tons all told, but she develops 31,625 lb. of tractive effort, and hauls 12 or 14 long railway cars from London down to Plymouth, 225 miles, at a rate of 54·7 miles an hour, without stopping. A similar non-stop run is from Swindon to London, 77¼ miles, at a rate of 61·8 miles an hour. These new Great Western engines of the Castle type are four-cylindered mechanisms, carrying almost all the new devices added to the steam locomotives anywhere in recent years, and they concede nothing whatsoever to locomotives of any size anywhere else in the world. . . .

"And the comfort of the seats of those British railway carriages! An English first-class compartment has, I veritably believe, the most comfortable seats of any moving vehicle in all this world. You sit down in them and ride for hours without feeling any discomfort whatsoever. The third-class compartments have seats only slightly inferior. Here is a lesson that our American rail-roaders might learn.

"One other important lesson the American railroad executive might well gain from British practice. The English sleeping-car is the most comfortable vehicle of its sort that yet has been evolved. There are no open berths. There are no upper berths. Instead, the car is divided into 14 or 16 compartments, each with a small wash basin and a tiny table and a single lower berth running crosswise of the car—in a few instances the compartment will contain two of the lower berths. The berths are quite as wide as those in the average steamship cabin, and being genuine beds—not made up from day-seat cushions—they have a real degree of comfort."

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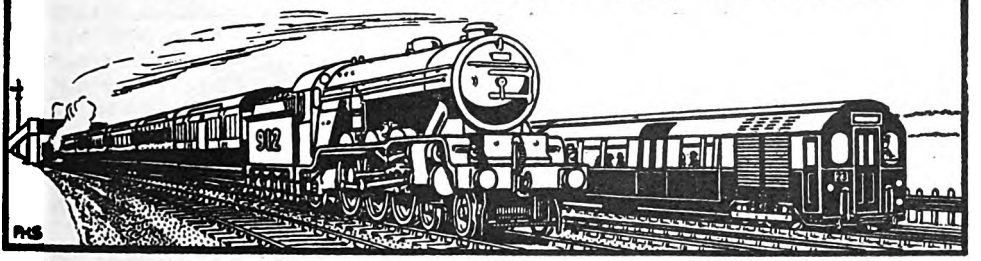
WHAT THE RAILWAYS ARE DOING.



THE Directors of the London Midland and Scottish Railway Company have made the following appointments :—

Mr. E. F. C. Trench, C.B.E. (hitherto Chief Engineer), Vice-President, Institution of Civil Engineers, to be Consulting Engineer to the Company.

Mr. A. Newlands, C.B.E., M.Inst.C.E. (Divisional Engineer, Western Division), to be Chief Civil Engineer to the Company.

Capt. M. Beasley, O.B.E. (Assistant for Marine Matters, Derby), to be Chief Marine Superintendent.

These appointments became effective as from February 1.

* * *

MR. E. F. C. TRENCH, C.B.E., Vice-President, Institution of Civil Engineers, who has been appointed Consulting Engineer, L.M.S.R., became Chief Engineer on the formation of the London Midland and Scottish Railway, as from January 1, 1923. He was born in 1869, at Ardfert Abbey, Co. Kerry, Ireland, and was educated at Monkton Coombe School, Bath, and afterwards for two years at Lausanne. Returning to Ireland, he entered the University of Dublin in 1888, taking the engineering degree of B.A.I., as well as the B.A., in 1892, and the M.A. subsequently in 1903. Early in 1893 Mr. Trench commenced a term of pupilage under Mr. E. B. Thornhill, then Chief Engineer of the London and North Western Railway. Part of this term was spent in the drawing office at Euston, and in assisting in various works on different parts of the system. In 1895 he was sent to Yorkshire to assist, first as a pupil and, subsequently, as an assistant, in the carrying out of a new line of railway between Huddersfield and Leeds. He was appointed in 1899 a Resident Engineer on the Midland Railway, several important widenings and new lines being carried out under his supervision. He read a paper on one of them, "The Alfreton Second Tunnel," before the Institution of Civil Engineers, in 1905. On the completion of these works in 1903 Mr. Trench was appointed Chief Engineer of the North London Railway, and during his three years with that company much work was done in bringing the structures on that line up to the requirements of modern loads and traffic. In 1906 Mr. Trench returned to the London and North Western Railway, being appointed Assistant Engineer, and subsequently promoted to the post of Chief Assistant Engineer, this position being held until September 30, 1909, when Mr. Trench was appointed Chief Engineer. On January 1, 1922, Mr. Trench became Chief Engineer of the enlarged London and North Western system consequent on the amalgamation of the Lancashire and Yorkshire Railway therewith, in 1923 taking similar office on the London Midland and Scottish Railway.

Elliott] [*& Fry.*

MR. E. F. C. TRENCH, C.B.E.,
Appointed Consulting Engineer, L.M.S.R.

* * *

MR. A. NEWLANDS, C.B.E., M.Inst.C.E., who has been appointed Chief Civil Engineer, L.M.S.R., became Divisional Engineer, Western Division, with headquarters at Crewe, in May, 1925. Mr. Newlands entered

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Highland Railway service in 1892, having completed an indentured apprenticeship with a private firm of civil engineers. In 1893 he was appointed to lay out and construct the Kyle extension of the Dingwall and Skye Railway, in which some of the heaviest rock excavations in the country were carried out, and deep-water pier at Kyle of Lochalsh. He also laid out and supervised the construction of the Wick and Lybster and Dornoch Light Railways, and was in charge of the greater part of the widening of the main line from Blair Atholl to Dalwhinnie and of widenings north of Inverness. In 1899 he was appointed Chief Assistant, in 1902 Assistant Engineer, and in 1914 Engineer-in-Chief with charge of Signal and Telegraph Departments. Early in 1923 he became Divisional Engineer in charge of the Highland Section of the L.M.S.R., being transferred to the Western Division, with headquarters at Crewe, in May, 1925, as above mentioned. Mr. Newlands was a member of the Water Power Resources Committee, which reported to the Government on the water-power possibilities of Great Britain. Among other subjects he is the author of a "Short History of the Growth and Development of the Scottish Railways."

* * *

MR. ROBERT W. GAIRNS, Assoc.M.Inst.C.E., who, as previously announced, was appointed as from January 1, 1927, District Engineer for the Central District, Scotland, L.M.S.R., with Glasgow as his headquarters, has had an extensive career as a civil engineer, and has been associated with many large engineering works on the old Caledonian Railway. He served his pupilage as a Civil Engineer on the construction of the Glasgow Central Underground Railway under Mr. D. A. Matheson, M.Inst.C.E., who retired at the end of last year from the position of Deputy General Manager (Scotland), L.M.S.R. On the completion of the Glasgow Central Line Mr. Gairns joined the staff of the Western District Engineer of the old Caledonian Railway as an Assistant Maintenance Engineer, in which capacity he acted for three years. He was afterwards transferred to the staff of the Caledonian Railway Engineer-in-Chief, where he acted in turn as an Assistant Engineer, Resident Engineer on New Works, Chief Assistant Engineer for Maintenance of Way and Works, and latterly as Personal Assistant and Deputy to the last Engineer-in-Chief of the old Caledonian Railway, Mr. W. A. Paterson, M.Inst.C.E., who retired from the service at the end of December, 1922, just prior to the railways being amalgamated at the beginning of 1923. On June 1, 1923, Mr. Gairns was appointed District Engineer to the L.M.S.R., on what was then the Highland Division, with headquarters at Perth, under Mr. A. Newlands, M.Inst.C.E., Inverness, who was later appointed Divisional Engineer at Crewe, when the Highland Division was absorbed in what is now the Northern Division of the L.M.S.R., with Mr. D. McLellan, M.Inst.C.E., as Divisional Engineer, his headquarters being at Glasgow.

* * *

MR. E. D. GRASETT, who has been appointed Divisional Superintendent, Derby, L.M.S.R., was educated at Lancing College. He entered the service of the Manchester, Sheffield & Lincolnshire Railway Company, under Mr. Haig Brown, then Superintendent of the Line. After experience in the fares and rates office and at stations, he was transferred to the Goods Train Department, giving attention to working at most of the large yards on the system. When the Great Central Extension to London was opened, he was appointed Chief Clerk to the District Superintendent at Leicester. In 1903, Mr. Grasett was appointed Outdoor Assistant to the Traffic Superintendent of the North Staffordshire Railway, holding that position until, in November, 1913, he was appointed Assistant to the General Manager. In April, 1914, he became Traffic Superintendent, a position which he held until the formation of the London Midland & Scottish Railway, when he became Superintendent of the North Staffordshire Section. In January, 1924, he became temporary Assistant to the Chief General Superintendent at Derby. Mr. Grasett was awarded the O.B.E. during the war, and is a member of the Institute of Transport.

* * *

CAPTAIN MYDDELTON BEASLEY, who has been appointed Chief Marine Superintendent, L.M.S.R., was apprenticed to Trinder, Anderson & Co. (Elder Line, London), and served on board sailing vessels in the Australian and South American trade for over seven years, part of this time as an officer. On obtaining a mate's certificate, he joined the West Indian Pacific Company, afterwards serving with Bibby Bros. & Co. During the Boer War he was in command of the s.s. *Yorkshire*, used as a transport for a period of twelve months. He also had charge of several other vessels. He entered the service of the old Midland Railway as Harbour Master at Heysham in 1904, assuming in 1905 the duties of Goods and Traffic Agent in addition to the Harbour Master's work. In 1912 the supervision of the Tilbury and Gravesend ferry steamers was added to his other duties. In 1915 he was appointed

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Marine Superintendent of the Midland Railway on the retirement of James Little & Co., who, until then, were the steamship managers of the Heysham and Barrow steamers. On the outbreak of the war, in August, 1914, on the application of the Admiralty for his services, Captain Beasley was sent to Queenstown in connection with the embarkation of the 6th Division. On completion, he returned to his railway duties until October, 1916. He then went to France as Assistant Director of Docks at Havre, and later at Rouen, with the rank of Lieut.-Colonel, and from December, 1917, to April, 1919, was on the headquarters staff at Richborough. For his war services he received the honours of O.B.E. and Chevalier de la Legion d'Honneur. Previous to taking up his present appointment, Captain Beasley was Assistant for Marine Matters, Derby.

* * *

MR. A. T. WELDON, who has been appointed Vice-President in Charge of Traffic, Canadian National Railways, in place of Mr. J. E. Dalrymple, retired, was born at Dorchester, New Brunswick, in 1876, and entered the employ of the former Intercolonial Railway at Moncton in 1890. Ten years were spent in various clerical capacities, mainly in the Freight Department, and in the Freight Claims Department at Moncton, and in December, 1901, he became Chief Clerk to Division Freight Agent, Nova Scotia Division, with headquarters at Halifax. In 1904 Mr. Weldon resigned from the railway to accept the position of Secretary to the Halifax Board of Trade, and two years later was appointed General Sales Agent, Port Hood Coal Company, with headquarters at Halifax. Less than a year later he rejoined the Intercolonial Railway as Division Freight Agent at Halifax, in charge of the Nova Scotia territory. After two years in Halifax he again resigned to accept a position with the Dominion Coal Company at Montreal, as General Freight and Passenger Agent of what was then known as the Black Diamond Steamship Line, operating between Montreal, Newfoundland, and Gulf Ports. In October, 1914, Mr. Weldon once more entered the service of the Intercolonial Railway in the capacity of Assistant General Freight Agent, with headquarters at Moncton, and in 1917 was appointed to the position of General Freight Agent of the Canadian Government Railways. A year later, when the amalgamation took place between the old Canadian Northern and the Canadian Government Lines, he was appointed Assistant Freight Traffic Manager, with headquarters at Moncton, and a little later Assistant Freight Traffic Manager of lines east of Port Arthur, with headquarters at Montreal. He continued in this position until the final consolidation of the Canadian National in 1923, when he was appointed Traffic Manager (freight and passenger), Atlantic Region, with headquarters at Moncton. In August, 1926, he was appointed to the office of General Traffic Manager of the system, a position abolished coincident with his elevation to the rank of Vice-President.

* * *

IT is officially announced that the directors of the Great Western Railway have authorised the following appointments:—

Mr. A. S. Mills, District Goods Manager, Worcester, to be District Goods Manager, London, in succession to Mr. J. W. Lovejoy.

Mr. W. Davis, Chief Clerk to the Chief Goods Manager, Paddington, to be District Goods Manager, Worcester.

Mr. H. W. Payne, Chief Goods Manager's Office, Paddington, to be Chief Clerk to the Chief Goods Manager, Paddington.

* * *

Since its issue early in December, 2,500 copies of the "Underground" "Pageant of London" poster have been sold to the general public, including schools and institutions, for illustration purposes during history lessons.

* * *

MR. W. J. THOMAS, who has been appointed Chief Marine Assistant to the Chief Docks Manager of the Great Western Railway Company (Mr. Charles S. Page), the Marine Department having been amalgamated with the Dock Departments and placed under the control of the Chief Docks Manager as and from January 1 last, joined the G.W.R. Company in May, 1924, as Engineer-assistant to the Marine Superintendent (Capt. H. Sharp, who recently retired). Mr. Thomas is well known in shipping circles, having been Assistant Superintendent and afterwards Chief Superintendent to the Hain Steamship Co., Ltd.

* * *

FOLLOWING the usual meeting of the Irish Managers' Conference, held at the Irish Railway Clearing House on January 13, a presentation was made to Mr. C. A. Moore on his retirement from the position of General Manager of the Belfast & County Down Railway. The chair was occupied by Mr. H. Hunt, Londonderry & Lough Swilly Railway, and among others who spoke were Mr. J. B. Stephens (G.N.R., Ireland), Mr. J. Pepper (N.C.C.), Mr. F. W. Minnis (B. & C.D.R.) and Mr. G. E. Smyth (late G.S. Railways).

* * *

IN the Officers' Room at Liverpool Street station on January 12, Mr. Thomas O. Mein,

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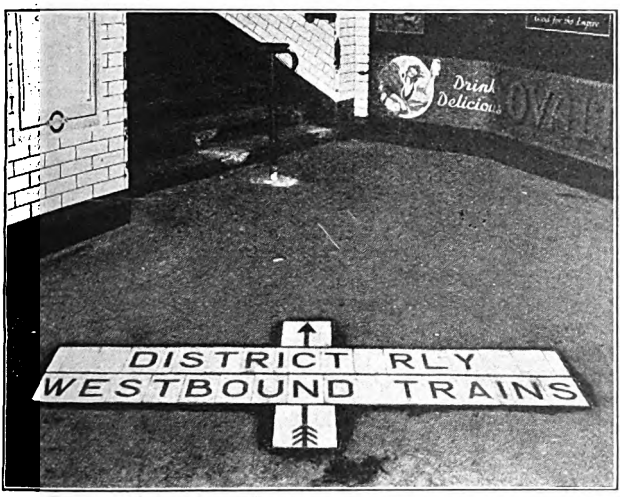


FLOOR DIRECTION SIGNS ON THE "UNDERGROUND."

The sign illustrated, in use at Charing Cross "Underground" station, is composed of black rubber letters inlaid in aluminium troughs let into blocks of white rubber, Other floor signs in use consist of aluminium letters inlaid in quick-drying cement.

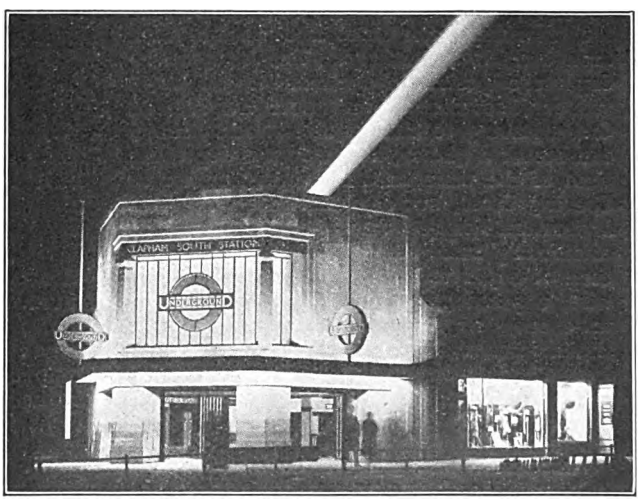
Works Manager at Stratford (L.N.E.R.), was presented with a medal awarded by the Grand Priory in the British Realm of the Venerable Order of the Hospital of St. John of Jerusalem for long and conspicuous service rendered to the Order. The presentation was made by Colonel Wm. Johnson Galloway, one of the Directors of the railway. Mr. Mein was appointed an Honorary Serving Brother in 1910 and an Honorary Associate in 1920. He was Secretary of the Stratford Division from 1891 to 1898, and since the latter date had acted as General Secretary of the G.E. Ambulance Centre. It was due to Mr. Mein's initiative that the Inter-Railway Competitions were established. Mr. Mein is also a representative of the L.N.E.R. on the Ambulance Committee, the Ambulance Staff Committee, and is Deputy Railway Representative on the Council of the Order. Col. Galloway mentioned how rarely this medal is awarded, by which, of course, its value was enhanced, and he congratulated Mr. Mein and the company on such a distinct honour being paid.

* * *

THE second annual dinner of the Pupils and Premium Apprentices' Association, Eastleigh, was held at the South Western Hotel, Southampton, on January 28. The Chairman of the Association, Mr. Stanley T. Willcox, presided, and was supported by Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer, Southern Railway; Mr. J. A. Hunter, Locomotive Works Manager, Eastleigh; Mr. T. S. Finlayson, Chief Locomotive Draughtsman, and Mr. E. Chard, Leading Locomotive Draughtsman, Southern Railway, Eastleigh. The toast of "The Southern Railway and Chief Mechanical Engineer's Department" was proposed by Mr. R. G. S. Duncan, to which Mr. Maunsell replied. He mentioned the fact that that annual dinner was noteworthy because there were only two other similar functions in the kingdom, *i.e.*, the "Crewe Re-union Dinner," and the "Stratford Pupils, and Premiums, Dinner."

* * *

WHAT is believed to be a world's record in Continental travel figures was achieved by the Southern Railway in 1926. For the 12 months just passed, 2,000,577 passengers were carried by the Continental and Channel



STATION INDICATION BY SEARCHLIGHT ON THE "UNDERGROUND."

A view is reproduced showing searchlight illumination of Clapham South station, Morden Extension. The idea is that the searchlights indicate the location of each station. Projection takes place each weekday evening from dusk until midnight.

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Island services, a figure never before achieved by this or any other railway having Continental connections. The "two millionth passenger" travelled to Berlin by the 4.0 service from Victoria via Dover-Calais on December 31 last. An indication of how this Continental traffic has grown is shown by the fact that it was only in 1920 that the one million figure was passed, when the figures were 1,194,257 passengers.

* * *

Two coloured posters issued by the Southern Railway Company are quite up to their usual high standard both as regards design, execution and attractiveness. One of these, calling attention to the Atlantic Coast Express—here styled "The Southern Ace"—shows the card of that name with the word "ace" quaintly introduced into the centre thereof. The combination of bright red and green and black on white is cleverly harmonised. The other poster, designated "The Social Whirl," relates to the cheap fare facilities for shopping and social purposes afforded between 10.30 a.m. and 4.30 p.m. daily, by the Southern Electric. The "whirl" is pleasingly worked out in red and blue and black, and is certainly very attractive.

* * *

A NEW type of train-departure poster has been introduced by the Southern Railway at Charing Cross, Waterloo Junction, Cannon Street and London Bridge. Hitherto posters have been exhibited at these stations showing the train-departure times and platforms for each station separately. The new train-departure poster is common to all these stations, so that a passenger at Charing Cross, having to change at London Bridge, can see at a glance, not only the departure time of the train, and platform number at Charing Cross, but also the time of arrival at London Bridge from Cannon Street of his connecting train, the platform number, and time of departure from that station. Likewise, a passenger at Cannon Street, having to change at London Bridge, can obtain similar information with regard to trains from Charing Cross.

* * *

EXCURSION facilities on the L.M.S.R. are to be considerably increased during 1927 (as explained by an officer of the company). This extension had been planned for 1926, but the strike prevented its operation. New stations are constantly being added to the list for period bookings, and there will be a big advance in this direction in the coming season. An extensive programme of day and half-day excursions is now being arranged, and details will be published in due course. The company intend to put on more excursion trains wherever they find a demand for them. The general popularity which the "luxury" excursions with restaurant cars achieved in 1926, it was stated, would not be overlooked, and this feature will figure largely in this year's programme.

* * *

THE Great Southern Railways of Ireland have decided to equip their main line depôts at Inchicore, Ballybrophy, Limerick and Cork with water-softening installations of the most modern and scientific type, and have placed the entire order for this work with a British firm, United Water Softeners Limited, of London. The Sudan Government Railways and the Great Indian Peninsula Railway have also placed orders for softening installations with United Water Softeners Limited, the water softener adopted in all three cases being the well-known Lassen-Hjort lime-soda system, already used on British railways.

* * *

THE Southern Railway are issuing what may be termed a "key" series of coloured posters, two of which are now before us. These are designed to call attention to certain Continental services—one, the night service to Paris from London (Waterloo), via Southampton and Havre; the other, to Belgium and Germany, from Victoria via Dover and Ostend. In each case the moral is pointed by means of a key which, in the Paris poster, is in light green on black, with white and yellow lettering; and, in the Belgium-Germany poster, in cerise—also on a black background, with other colours such as blue and yellow well in evidence.

* * *

RAILWAY HEAD CODES AND GENERAL ADVERTISING.—In a recent issue of *The Southern Railway Magazine* reference is made to the effective utilisation by the Hōvis Bread Company of the head codes used on certain Southern Railway electric routes. They are as follows:

H = Hampton Court.
ō = Hounslow.
V = Kingston "roundabouts."
I = Dorking North.
S = Shepperton.

An ingenious feature is the utilisation of the Hounslow loop route letter "O" with the stroke across it. This differentiation

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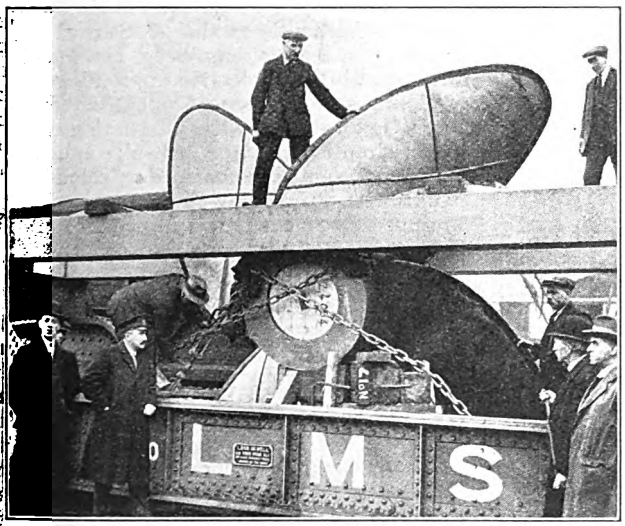

[*Topical.*

CONVEYING A PROPELLER, WEIGHING 18 TONS 6 CWTS., FOR THE "MAURETANIA," FROM CAMDEN GOODS STATION, (LONDON) TO LIVERPOOL BY L.M.S.R.

indicates the direction in which the loop is followed.

* * *

WITH further reference to the "Pertinent Paragraph" entitled "A Diminutive Standard-Gauge Railway Station," which appeared on page 320 of the October number, Mr. G. T. Moody writes as follows: "May I mention another case of an extremely small station, which I am surprised has not been mentioned by any of your previous correspondents. I refer to West Runton, on the Midland and Great Northern Joint Railway between Sheringham and Cromer Beach. There is but one platform, neither sidings nor signals, while booking office and waiting room accommodation is provided for by a corrugated iron hut, and a goods lock-up by the body of a covered goods wagon. This station is served by both M. & G.N. and L. & N.E. (G.E. section) trains, numbering about 15 each way. Needless to say, there are no Sunday trains."

* * *

FOUR additional 2-6-0 mixed traffic engines (the remainder of the first series) have recently been turned out at Crewe, unpainted, viz., Nos. 13036–9. Delivery of twenty-five 0-6-0 superheater goods engines ex Andrew Barclay, Sons and Co., is now in progress, the first five of which, Nos. 4357-61, are already in service. Of the same type, the N.B. Loco. Co. have delivered Nos. 4402-6, these being the last of that particular series. A second engine of the 4-6-0 "Experiment" class is now running fitted with superheater, viz., No. 5472, *Richard Moon* (late No. 1993). Latest conversions to class "GI" (superheater) are No. 1776 (formerly class "G") and No. 2528 (formerly class "D"). These engines are now L.M.S. Nos. 9131 and 9027 respectively, the former (but not the latter) being provided with a standard Belpaire boiler. With one or two exceptions, all the "Claughtons" and "Princes" which were fitted up to burn oil fuel during the recent coal strike are now re-converted back to coal.

* * *

IN reply to several correspondents, Mr. C. Williams explains that the large S which has been noted on the cab sides of certain "Claughtons" and "Princes" indicates that the engines in question are "starred" for working in certain links. The "Claughtons" thus fitted include Nos. 179, 211, 2239, 5994 and 6003. The ex L. & N.W. 4-4-0 locomotive No. 639, *Ajax* (now L.M.S. No. 5190), to which reference is made on p. 165 of the February RAILWAY MAGAZINE, is at present stationed at the Longsight (No. 16) shed.

* * *

THE L.N.E.R. have just completed the new station at Berwick at the north end of the Royal Border Bridge across the Tweed. The new station is built in the latest style, having a large island platform with waiting rooms, refreshment rooms, bookstalls and telegraph office. Electrically-operated hoists are provided for luggage to the main block of buildings, which comprise booking hall, booking office and cloak room. The booking office is divided from the booking hall, by a framed, panelled and glazed screen, and the whole of the station premises are heated by a special system of hot-water radiators. The whole of the work has been carried out without interference to the train services.

* * *

THE T.O.T. Philharmonic Society announces five performances of Gilbert and Sullivan's "Ruddigore" at the Scala Theatre, Charlotte Street, W. (near Goodge Street Tube station), on Wednesday, Thursday, Friday and Saturday, March 2, 3, 4 and 5, at 8 p.m., the matinée on the Saturday to commence

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at 2.30 p.m. The opera will be produced by Mr. Emil Hardy and musically directed by Mr. Charles Lambert. All seats are reserved, and applications for tickets should be made to the Hon. Ticket Secretary, Mr. H. W. Blunden (Room 364), 55, Broadway, Westminster, S.W.1 (telephone, Victoria 6800).

* * *

WITH reference to the list of Highland Railway locomotives published on page 395, November issue, of THE RAILWAY MAGAZINE, Mr. James F. McEwan writes to point out that of the numbers 14277 and 14278 shown as unnamed "Skye Line" engines No. 14277 was the number allotted to H.R. 4-4-0 No. 67 *Cromartie*, built in 1874 and withdrawn in 1922–3. No. 14278 is a 4-4-0 engine named *Fife*, built in 1886 and generally similar to 14277 except for a larger boiler. The other numbers mentioned, Nos. 14279 to 14285 are carried by "Skye Line" engines previously H.R. Nos. 32, 33, 34, 48, 86, 87, and 88. Nos. 32, 33 and 34 prior to 1899 were Nos. 5, 6, and 7. The Stroudley 0-6-0T's are numbered 16118, 16119 and 16383 and were 56B *Balnain*, 57B *Lochgorm*, and 49A *St. Martins*.

* * *

HALL, Lewis & Co., railway wagon builders of Cardiff and Doncaster, have presented to the Doncaster New Infirmary Fund a 12-ton railway wagon. The idea is that this wagon shall make as many journeys as possible carrying coal for the infirmary, and that the hire charges saved will be handed over to the infirmary fund. The wagon is inscribed "This wagon has been presented to the Doncaster New Royal Infirmary. Please help to increase its earnings by having it emptied and returned quickly to the Bullcroft Main Colliery, Doncaster." The wagon will be kept in good repair, free of charge, by the donors, who have entered into an arrangement with the Bullcroft Colliery.

* * *

THE Great Northern Railway (Ireland) has announced reductions in the already remarkably low fares, which last summer were a great inducement for trips to Howth. Under the new scale of charges, the third-class return fare from Amiens Street to Howth station is 9d., and to the Hill of Howth, 1s. Single fares and season tickets between Dublin and stations as far as Hill of Howth are also reduced.

* * *

IN connection with the Cape Town suburban electrification now in progress by the South African Government Railways, the Westinghouse Brake & Saxby Signal Company's tender has been accepted for direct-current all-electric power working of points, and electrical operation of day colour light signals with alternating-current track circuits at Cape Town; and automatic and semi-automatic day colour light signals with alternating-current track circuits equipped with resonated impedance bonds, between Cape Town and Wyberg.

* * *

IN response to an inquiry as to the whereabouts of L.M.S. "Precursor" class 4-4-0 No. 639, *Ajax*, Mr. C. R. Prescott mentions that on January 3 he saw this engine at London Road station, Manchester, bearing shed plate No. 16, Longsight. He also mentions that the residential expresses from Manchester to Buxton now include new steel, centre-corridor coaches in their make-up.

* * *

MR. C. R. PRESCOTT further mentions that during the Christmas period he noted the Llandudno–Manchester Club Saloon express worked by 4-4-0's Nos. 5404, *Colwyn Bay*, 5403, *Leamington Spa*, and 5365, *Racehorse*, all of them in the new red livery and all exceptionally well cleaned, and with the coach formation, similarly in newly painted red stock, very spic and span. The attractive appearance of this train is further enhanced by the fact that the standard vehicles are uniform in size and type.

* * *

COMMENTING upon the "excellence" of the photograph reproduced as frontispiece to the February number, Mr. L. R. Williams, writing from Bristol, points out that, next to the train engine, the through Penzance-Glasgow Great Western coach is particularly noticeable. This works to Crewe on the 8.30 a.m. ex Plymouth, 12.25 p.m. ex Bristol.

* * *

COMMENCING February 1, an improved train service was given between London and Oxford by the G.W.R. on week-days. The 11.15 a.m. express from Paddington now slips a coach at Didcot at 12.12 p.m., connecting with the 12.15 p.m. train thence to Oxford, where passengers arrive at 12.38 p.m. Travellers from London thereby save half-an-hour on the journey.

* * *

THE L.N.E.R. has reduced further the minimum fares for half-day excursions from 5s. to 2s. 6d. on and from January 29. Half-day trips at the new minimum fare have been arranged to run between Doncaster and

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Leeds, Mansfield and Sheffield (Wadsley Bridge) and Chelmsford and London (Liverpool Street). These new half-day fares are considerably below the ordinary excursion rates, and in many instances average 3½ miles for a 1d.

* * *

THE garage which has been constructed, in accordance with the announcement made last September, adjacent to Morden "Underground" station, was opened on January 31. It is situated opposite the station, in the main Epsom Road, and provides accommodation for upwards of 200 cars and cycles. A number of private lock-up sections are included. The garage has all usual facilities for supplying petrol, washing, &c., together with a workshop and stores. Very reasonable charges have been arranged.

* * *

A CORRESPONDENT writing from Hereford states that on the L.M.S.R., Midland branch, to Three Cocks Junction some six-wheeled North Stafford section coaches have been used in conjunction with Midland and L.N.W. stock, in both the old and new colours. On a recent occasion the 9.20 a.m., Midland, Hereford-Brecon train was composed of an L.N.E.R. six-wheeled van, three six-wheeled N.S. coaches, and a six-wheeled L.N.W. van still in the old colours. The locomotive was Midland 0-4-4T No. 1422.

* * *

A "CLAUGHTON" class 4-6-0 locomotive has been fitted with Caprotti valve gear, and has been the subject of trial trips between Crewe and London. The engine was fitted with indicator shelter, and a dynamometer car was attached behind. The inventor and an Italian locomotive inspector were present.

* * *

MR. E. J. KLAPPER, of 4, Wellington Road, Bow Road, London, E.3, sends a mimeographed calendar for 1927, which is a good example of elaborate work by this method. The calendar is intended for general use, but at the head there is a well-executed sketch of a locomotive engine.

* * *

WE are informed that the business and interests of the British Air Brake Co. Ltd., have now been merged with those of the Consolidated Brake & Engineering Co. Ltd., in which name the joint business will in future be conducted.

MR. WILLIAM BRYDE, English Agent of the Pennsylvania Railroad (U.S.A.), of 20, Water Street, Liverpool, sends a copy of the 1927 calendar issued by the Pennsylvania system. It is headed "The Broad Way of Commerce," below which is a vivid night picture, in colour, showing the Broadway Limited Express, New York to Chicago in 20 hours, passing steel furnaces in the steel district. An unusual feature is that the three-monthly date strips are given as December (1926), January and February; January, February and March; February, March and April; and so on; so that besides the current month, that preceding and that following are always available for reference.

* * *

REFERRING to the article on "Edinburgh and Glasgow Routes of the L.N.E.R.," published in the January and February numbers, "Staffordshire Knot" points out that there must be at least six booked passenger trains using the direct line from Cowlairs to Maryhill (Glasgow). This section was shown on the map as not used by passenger trains. These are the 6·42 a.m. from Milngavie, which returns at 7.58, via Partick, Queen Street (L.L.), Springburn and Maryhill; the 7.51 a.m. from Milngavie to Queen Street (H.L.), and the four through trains from the latter station to the West Highland line.

* * *

SAXBY & FARMER (India) Limited, of Calcutta, who are associated with the Westinghouse Brake & Saxby Signal Co. Ltd., of London and Chippenham, have been given the contract for the supply of Westinghouse semi-automatic daylight signals, and A.C. track circuiting, over approximately 3 miles of double track, between Churchgate and Grant Road, on the Bombay, Baroda & Central India Railway, the control apparatus for these signals being located in four cabins.

* * *

THE WIMBLEDON MODEL RAILWAY CLUB fixtures for March include: March 7, lecture on "Railway Appliances," by Mr. E. W. H. Lawrence (of Messrs. Ransomes & Rapier); March 14, Test Track night and monthly competitions, 7.30 p.m. Both meetings at the Red Cross Hall, Church Road, Wimbledon. March 21–26, Wimbledon's "Week of Youth.—An exhibition of Handicrafts and Hobbies."

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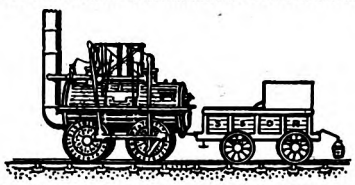
LOCOMOTIVE MATTERS.



Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

It is understood that this year's locomotive building programme includes 60 new Midland type 4-4-0 compounds, Nos. 900-934 and 1184-1199; 200 Class "4" Midland type 0-6-0's, Nos. 4207-4406; and 50 three-cylinder 4-6-0 locomotives. The following locomotives have been noted at Gloucester: New 0-6-0's Nos. 4285 and 4338; rebuilt Johnson 0-6-0T No. 1875, with Belpaire firebox, "Pop" safety-valves, &c.; and rebuilt 0-6-0's Nos. 3147, 3149, 3424, 3492 and 3613, with Belpaire fireboxes.—["R.O.D."]

0-8-0 No. 1891, together with an L.M.S. 0-6-2T, have been noted recently at Cardiff Docks.—[W. JONES.]

Additional Midland 0-4-4T's, fitted with Belpaire fireboxes, "Pop" safety valves, &c., include Nos. 1342, 1349 and 1402.—[F. H. GILLFORD.]

N.L. 4-4-0T's, formerly Nos. 2835, 2840 and 2858, are re-numbered 6456, 6475 and 6470.—[J. G. BROWN.]

Class "4" 0-6-0 No. 4276 has been working over the S. and D.J.R. recently.—[R. A. ATTHILL.]

(*See also "What the Railways are Doing."*)

L.N.E.R.

'Pacific" type 4-6-2 No. 2553, formerly *Manna*, is now named *Prince of Wales*. G.E. section 2-4-2T No. 7675 was noted at Wood Green on a G.E. local train set.—[S. WENYON.]

No. 231 is the first left-hand drive 2-6-0 noted in the London district, G.N. section. This engine recently worked an afternoon King's Cross–Manchester fast goods, and appears to be stabled at Gorton.—[J. G. BROWN.]

N.E. 4-4-0 No. 1927, still in the old N.E. livery, has been observed working on the G.E. section between Liverpool Street and Bishop's Stortford.—[A. HILLS.]

Presumably owing to bad coal, certain trains on the Colchester main line of the G.E. section have been piloted since January 3. G.C. locomotives noted on this section lately include 0-6-0 No. 5829 and 4-4-0 No. 6399, *Allan Bane*.—[G. H. YOUNG.]

After 18 months as shed pilot at Colwick locomotive depot, No. 3766, the last of the Stirling 0-4-4T's, has been withdrawn from service.—[F. H. GILLFORD.]

Since the commencement of the coal dispute a large number of coal trains have been worked from Immingham over the East Lincoln lines, conveying imported coal to the southern parts of the system. The trains have been worked almost entirely by G.C. type 2-8-0's and G.E. 0-6-0's. A special service of coal trains on Sundays has been provided in order to relieve congestion on week-days. Several of the new "general purpose" class "J39" 0-6-0's are working mineral trains on the G.C. main line into Grimsby. G.N. 4-4-0's Nos. 3045, 4304, 4307, 4314 4343, 4351, 4371, 4376, and 4382; 2-4-0 No. 3814; 0-6-0 No. 4152, rebuilt with larger boiler; and 0-8-0 No. 3424 have been employed between Boston and Grimsby. "Atlantic" No. 3989 is stabled at Boston shed. Several N.E. type 0-6-0's have worked recently in the Lincolnshire area.—[J. D. ROBINSON.]

During the early part of the winter G.E. 4-4-0 No. 8785 and G.N. 2-6-0 No. 4694 worked expresses between Manchester and Liverpool on the Cheshire Lines. It is understood that the only remaining G.C. "single-driver" engine, No. 5969, has been broken up, after spending her last days on C.L.C. trains. An unusual working for a small G.C. 4-4-0 was that noted on

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November 26 last, when No. 5111 worked the 3.20 p.m. Marylebone to Manchester train. Owing to reconstruction work on a bridge near Trafford Park, C.L.C., on Sunday, December 12, Manchester–Liverpool and Manchester–Southport, C.L.C., trains were diverted via Stockport, rejoining the proper line at Glazebrook. Local services between Manchester and Irlam were suspended until 4.30 p.m.—[R. DYSON.]

Seven of the "Ardsley" tanks are stabled at Eastfield, Glasgow; Nos. 616-618, 621, 622, 635 and 636. N.E. 0-6-0T No. 2190, formerly stationed at this depot, has been replaced by N.E. No. 453 of the same type, which shunts in Cowlairs yard. N.B. locomotives recently withdrawn from service include: 2-4-0 No. 10249; 4-4-0's Nos. 10361, and 10387; class "R" 0-6-0T's Nos. 1328, 1352, and 1358; and 0-4-4T's Nos. 9090 and 9586. G.C. 2-8-0's Nos. 6288, 6290, 6291, 6328, 6346, 6351, 6352, 6370, 6372 and 8286, have been through the shops at Cowlairs.—[A. KENNEDY.]

The following G.C. type "Director" 4-4-0's are stationed in Dundee; Nos. 6386 *Lord Glenallen*, 6393 *The Fiery Cross*, 6394 *Lord James of Douglas*, 6395 *Ellen Douglas*, and 6396 *Maid of Lorn*. These engines are engaged principally on fish traffic and semi-fast passenger duties between Dundee and Edinburgh. N.B. "Atlantics" handle the expresses between Edinburgh and Dundee, and Dundee and Aberdeen, and include Nos. 9510 *Lord Provost*, 9877 *Liddesdale*, 9878 *Hazeldean*, from Edinburgh shed, and 9869 *Bonnie Dundee*, from Dundee, for the Edinburgh–Dundee section; while Nos. 9509 *Duke of Rothesay*, 9868 *Aberdonian*, 9902 *Highland Chief*, from Dundee, and Nos. 9870 *Bon Accord*, 9871 *Thane of Fife*, and 9872 *Auld Reekie*, from Aberdeen, for the Dundee–Aberdeen section. On trains exceeding 12 coaches, these engines are often assisted by G.N. 4-4-0's, including Nos. 3055, from Ladybank Junction sheds, and 3062, from Perth. With N.B. 4-4-0 No. 9574, No. 3062 also works "locals" to Ladybank. G.N. type 0-6-2T's Nos. 2585 and 2591, from Dundee, and 2590, from Tayport, work Tayport line trains. During November last "Atlantics" Nos. 9901 *St. Johnstoun*, 9903 *Cock o' the North*, and "Directors" 6390 *Hobbie Elliot*, 6391 *Wizard of the Moor*, from Edinburgh shed, and Nos. 6387 *Lucy Ashton* and 6388 *Captain Craigengelt*, from Perth, were noted working between Perth and Edinburgh via Glenfarg.—[C. L. THOMSON.]

G.W.R.

Four and two-cylinder 4-6-0's now work over the Gloucester–Newport section.—["R.O.D."]

A number of the larger types of engine, including R.O.D. 2-8-0's, 2-6-2T's, 2-8-0T's and "Bulldog" class 4-4-0's, now work into the Cardiff Docks area. Ex T.V.R. 0-4-0T *Trojan* was noted on a workman's train between Cardiff Docks and Parade stations. "Duke" class 4-4-0 No. 3258 *The Lizard* recently hauled the Brighton–Cardiff restaurant car express into Cardiff.—[W. JONES.]

2-6-0's from Southall regularly work milk trains from West Ealing to Kensington (Addison Road) over the electrified C.L.R., assisted by 2-4-2T's from Old Oak Common sheds.—[F. J. T.]

2-4-2T No. 1192, referred to by a correspondent in these columns in the January issue as working on the Culm Valley branch, is stationed at Oswestry sheds. The engine noted on the Culm Valley line may have been late Cambrian No. 1196 formerly No. 58, recently sent from Oswestry.—[G. S. PRICE.]

S.R.

0-4-4T's Nos. 662A and 703A have replaced small 0-6-0T's Nos. 178A and 323A on the principal Otford-Sevenoaks branch services. 4-4-0's Nos. 449A and 477A have been noted on London-Kent coast services via Maidstone East. 0-6-0 No. 582A is stationed at Sevenoaks (Bat and Ball), a shed holding one engine only.—[W. G. A. THOMAS.]

In addition to "A" section 4-4-0's and 2-6-4T's noted at Portsmouth, 0-6-0 No. 695A may also be included. 0-6-0T No. 661B has had the Westinghouse brake-gear removed and replaced by the vacuum apparatus. "B" section locomotives, including 0-4-4T's Nos. 372B and 379B and 0-6-2T No. 465B, work round from Portsmouth to Southampton Docks with the 1.15 p.m. train. "H" class 4-4-2T's Nos. 595B and 602B have been rebuilt to conform with Nos. 596B and 598B, class "H1x." Owing to the system by which boilers removed for repair are placed in stock and utilised for other engines as required, in order to save unnecessary delay occasioned by an engine having to wait for its own boiler to be repaired, certain "B" section engines formerly fitted with boilers equipped with the additional dome and top-feed apparatus now have boilers without the extra dome, and in the case of 0-6-0's Nos. 551B and 553B without the top-feed arrangement as well. These include 2-6-0's Nos. 339B, 347B, 348B, 353B and the two 0-6-0's previously mentioned.—[M. BATTEN.]

0-4-0T's Nos. 99E and 0745E, from Bournemouth and Poole respectively, perform the shunting duties on Poole quay.—[CHAS. H. MOON.]

2-6-4T's up to Nos. 807A are in service,

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also 4-6-0's Nos. 802E-804E. The following "Adams" 0-4-4T's are in the London area: Nos. 4, 5, 12 and 363, at Feltham; Nos. 13 and 359 at Guildford, and small class Nos. 193 and 217 at Feltham.—["TINTAGEL."]

S. & D.J.R.

Small 0-6-0 No. 8 was seen at Bournemouth during the Xmas holidays. This locomotive has rather an interesting history. Built originally as a 0-6-0, it was converted to a 0-6-0T, and is now running as a 0-6-0 tender locomotive again. Most of the small 0-6-0's are still running, and are numbered 8, 19-28, 33-44, and 46-51. The numbers of the thirteen 4-4-0's are 14-18, 45, 67-71, 77 and 78. The six new heavy passenger locomotives reported in the April issue to have been in course of construction, are not in service at the time of writing.—[C. H. MOORE.]

Metropolitan Railway.

No. 18, the last of the first batch of 4-4-0T's built in 1864, is still in service. It bears a plate inscribed "Neasden Works, 1924," this being the date when it was last rebuilt. Other early 4-4-0T's still in service are Nos. 23 (1867), 27 (1868), 41, 48 and 49 (1870). The two 0-6-0T's Nos. 101 and 102 are still kept in the old shed at Neasden, but have not been in steam for several years, their work being done by 4-4-0T's.

Irish Railways.

No. 89, the second of the original two "single" locomotives on the G.N.R. of I. which was converted to a 4-4-0, is still running as originally reconstructed, except for an extended smokebox and the absence of a name-plate. The 5 ft. 7 in. coupled wheels and a boiler of the original pattern are retained. Several "A" class 0-6-0's, including Nos. 66A and 81A, working in the Belfast district have shortened pattern chimneys to facilitate working in the docks area in the city.

The 4-4-0 express passenger tender engines, known as the "321" class, constructed with non-superheated "taper" boilers, 6 ft. 7 in. coupled wheels and 1-in. frames, are now altered and running as follows:—As originally constructed, Nos. 324, 325, and 326; rebuilt as "331 class" 4-4-0's having altered frames 1⅛-in. thick, extended smokebox, raised footplating over coupled wheels, but retaining non-superheated "taper" boiler and original cab. Ross "Pop" safety valves, Nos. 327, 328, 329, 330, 331, and 332. Rebuilt with parallel non-superheated Belpaire boiler, Ross "Pop" valves, altered frames 1⅛-in. thick, raised footplating over coupled wheels, larger cab with extended roof, and modified extended smokebox, Nos. 321, 322 and 323. This list does not include any engines rebuilt from the "314" class 4-4-0's now running as ordinary 321's. [C. O. HARE.]

Waterford and Tramore section 2-2-2T No. 2, which was illustrated in the May, 1926, issue of THE RAILWAY MAGAZINE has been renumbered 484 and repainted in G.S. Railways' colours. Woolwich built 2-6-0's No. 374 and No. 377 are working the Cork to Rosslare boat express. They are fitted with tablet exchange apparatus, as the line is single from Mallow to Rosslare. Small boilered 4-4-0 No. 89 has been rebuilt with a larger boiler of the Belpaire type, and fitted with Ross "Pop" safety valves. She frequently works into Waterford on Limerick trains. Large boilered 4-4-0's Nos. 333 and 337 are now stationed at Waterford, and working the mail trains to and from Maryborough. 2-4-0 No. 290, rebuilt at Inchicore last year, is also stationed at Waterford. Dublin and South-Eastern section 0-6-0's Nos. 440, 441 and 443 are frequently seen on Wexford and Waterford (via Macmine) trains. No. 441 was recently observed on the 2.40 p.m. train Rosslare Harbour to Waterford, Waterford and Limerick section. 4-4-0 No. 296 works this train frequently. 0-6-0 tank engine *Jumbo* and 0-6-4T engine No. 203 are stationed at Waterford for shunting in the goods yards.—["URBS INTACTA."]

Latest renumbering of G.S. Railways locomotive stock includes:—4-4-0T No. 478 (C.B. & S.C.R. No. 7), 4-4-0 No. 547 (M.G.W.R. No. 125, *Britannic*), 0-6-0 No. 609 (M.G.W.R. No. 71, *Galway*), 0-6-0 No. 621 (M.G.W.R. No. 98, *Caledonia*), 0-6-0T No. 558 (M.G.W.R. No. 113, *Gnat*). New "K1" class 2-6-0 engines Nos. 379 and 380 left Broadstone Works early in December.—[K. A. MURRAY.]

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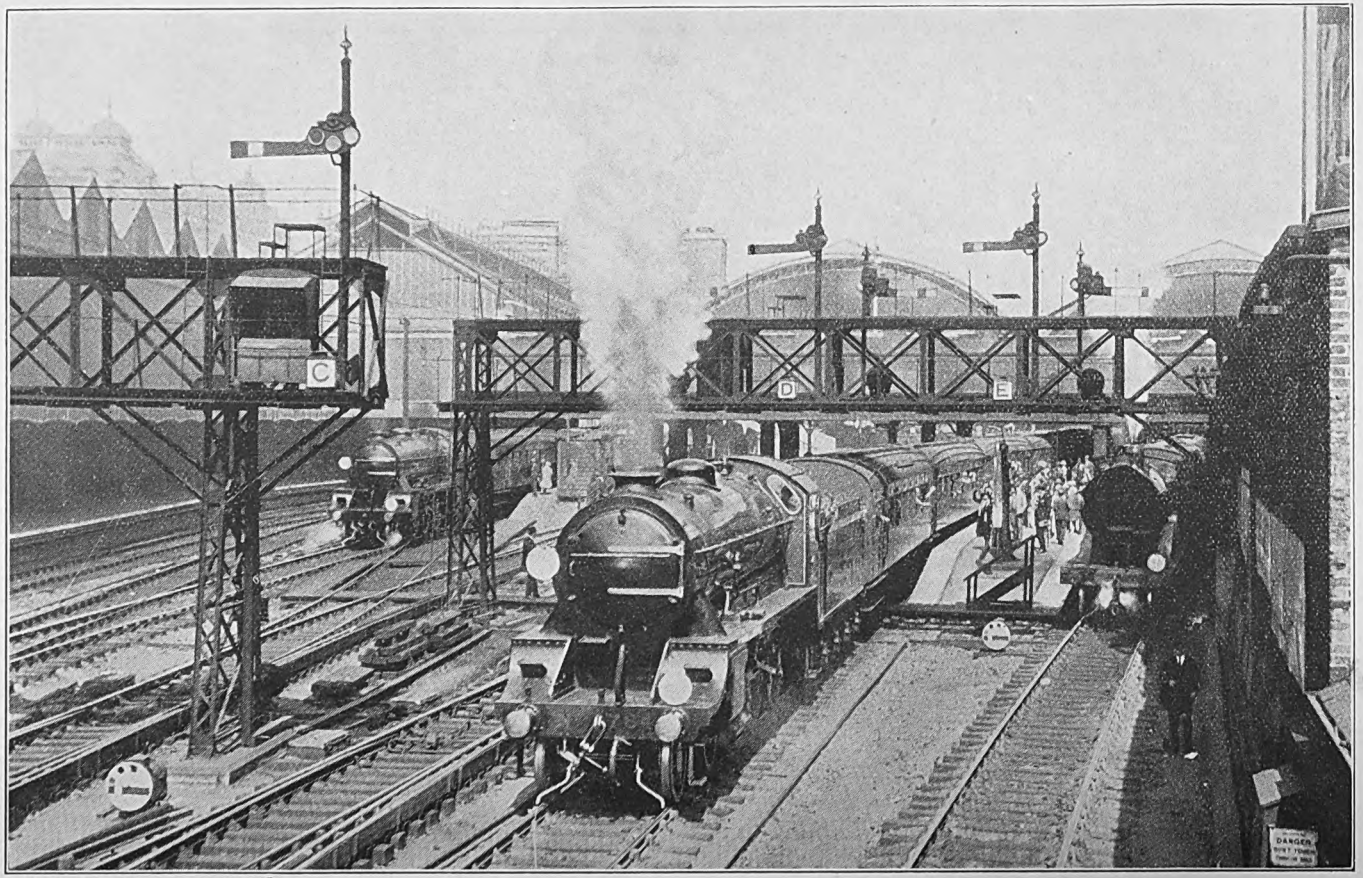

THE RAILWAY MAGAZINE.]

CONTINENTAL PULLMAN CAR EXPRESS LEAVING VICTORIA, EASTERN SECTION, S.R.

"King Arthur" class 4-6-0 No. 764E "Sir Gawain."

(From a Photograph by J. F. Gairns.)

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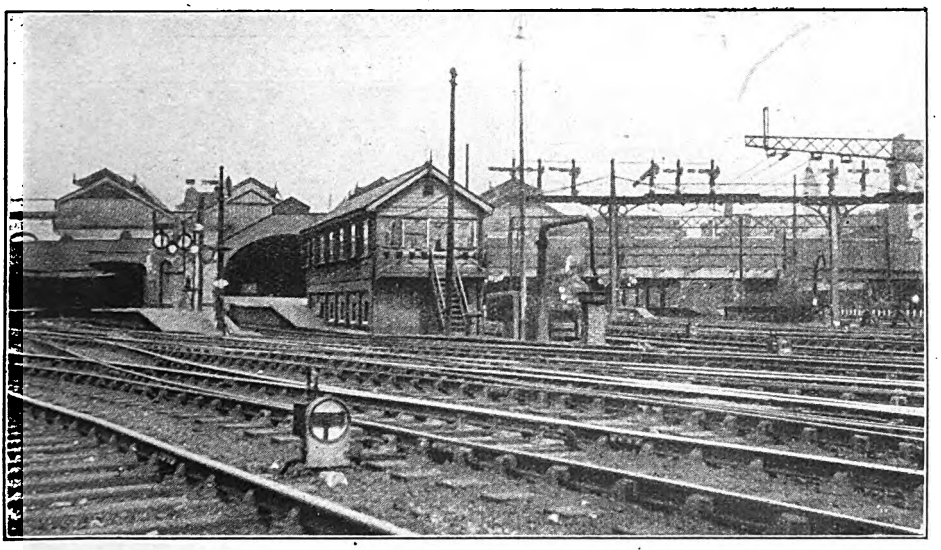

Photo.] [*J. F. Gairns.*

VICTORIA SOUTH CABIN AND GENERAL VIEW OUTSIDE CENTRAL SECTION.

Notable Railway Stations and their Traffic.

VICTORIA (LONDON), SOUTHERN RAILWAY.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

NOW that the two portions of Victoria station—previously, and respectively, the chief London termini of the former London, Chatham and Dover, and London, Brighton and South Coast Railways—are operated as one, it is a moot question whether the dual station should not be regarded as "the largest in the British Isles," in that, owing to the way the Brighton section is laid out, it has platform faces which will, nominally at least, accommodate no fewer than 24 trains simultaneously. If this point of view is adopted the great West End terminus of the Southern Railway is even larger than Waterloo, which, with its 21 main-line and two Waterloo and City platforms, is generally regarded as our biggest station.

Whether this claim can be maintained is, however, somewhat doubtful, seeing that although the Brighton section was enlarged to its present capacity only a bare twenty years ago, trainloads have so increased that many of the chief trains are now too long to permit of a given platform being used by another train at the same time, so that the effective capacity of the dual station is probably limited to about 22 trains at most. Further, until necessary alterations can be undertaken, the two sections are, from the operative point of view, as distinct as they were when separately owned, so that while staff, organisation, and general working apply to the whole station, the traffic of each portion has still to be conducted on a distinct basis, and one portion cannot yet be used to ease the pressure on the other, as the only track communication between one section and the other is of a transfer character. Hence, it follows that each part is restricted to its particular traffic, with corresponding loss of elasticity to meet traffic requirements as a whole.

In other respects, however, the changed situation brought about by grouping has enabled many changes to be made, with the incidental result that Victoria station,

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regarded as one, ranks not only as one of the busiest of the great London terminal stations, but accommodates train services radiating to an exceptionally wide variety of destinations. The following statistics indicate in some measure the volume of its traffic, and pave the way for detailed references to various phases in due course.

ANNUAL TRAFFIC STATISTICS.

(Approximate round figures.)

*Number of passenger tickets issued	6,000,000
*Receipts from passenger tickets issued	£1,070,000
*Number of season tickets issued	5,400
*Receipts from season tickets issued	£43,500
Number of passengers in and out	50,000,000
Number of Continental passengers (outwards only)	713,000
*Number of Continental passenger tickets issued	146,000
Items of Continental registered baggage (outwards)	381,000
*Receipts from Continental passenger traffic	£430,000
Pullman car receipts	£9,570
Number of platform tickets issued	1,000,000
Lavatory receipts	£9,720
Dog, bicycle, &c., tickets issued	46,000
Cloak-room traffic, items handled	875,000
Receipts from cloak-room traffic (including shop parcels)	£13,300
Excess fare receipts, &c.	£100,000
Tickets collected (excluding platform tickets)	13,500,000
Cloak-room tickets issued	641,000
Telegrams dealt with	464,000
Parcels forwarded	238,500
Parcels received	32,000
Receipts from parcels, &c.	£47,750
Checked luggage, P.L.A., &c.	12,100
Milk churns forwarded	21,500
Milk churns received	12,300
Fish, meat, &c., traffic forwarded, cwt.	17,400
Fish, meat, &c., traffic received, cwt.	4,600
Excess luggage, cwt.	5,400
Staff employed (without summer additions)	1,016

* These do not take into account the numbers available at Victoria but issued elsewhere, through bookings, returns, &c.

The following statistics show the number of trains dealt with daily :—

Number of steam trains—	
Arriving (winter)	126
,, (summer, not Saturdays)	139
,, (summer, busy Saturdays)	193
Departing (winter)	110
,, (summer, not Saturdays)	125
,, (summer, busy Saturdays)	225
Number of electric trains—	
Arriving	319
Departing	319

The original Victoria station was constructed under terms arranged with the Victoria Station and Pimlico Railway Company

An agreement or arrangement was entered into between the L.B. & S.C. Railway Company (The Brighton Company) and the Victoria Station and Pimlico Railway Company (The Victoria Company), dated April 24, 1858. This agreement was also set forth in the schedule to the above Act of 1858, and authorised and confirmed by Section LXXVII of the Act.

Under terms of this arrangement the Victoria Company provided the land for and constructed the railway from the southern bank of the River Thames (including the original bridge over the river) up to and under the whole of the then proposed bridge under the Eccleston Road, with two lines of rails. The Victoria Company also undertook, at their own cost, to clear off all buildings and level to 2 ft. below the level of rails a piece of land specially indicated in the agreement, in order that the Brighton Company might erect on the said piece of land a station and other buildings for the purpose and convenience of their own and the traffic of the West London and Crystal Palace Company. This land was to be absolutely conveyed by the Victoria Company to the Brighton Company free from all incumbrances except an annual rentcharge of £3,000, to be reserved and made payable by the Victoria Company, and charged upon the said land and on other property, and with an indemnity by the Victoria Company against the payment by the Brighton Company of more than the yearly sum of £1,500, part of that rent.

The Brighton Company constructed their original Victoria station on the above-mentioned piece of land, and the two lines from Battersea Pier to Victoria station were opened for traffic on October 1, 1860.

The conveyance of the Brighton Company's station was carried out by a deed of January 30, 1862, and the Victoria Company thereby granted to the Brighton Company, in pursuance of the Act (and agreement) of 1858, and also in consideration of the rentcharge having ceased, the

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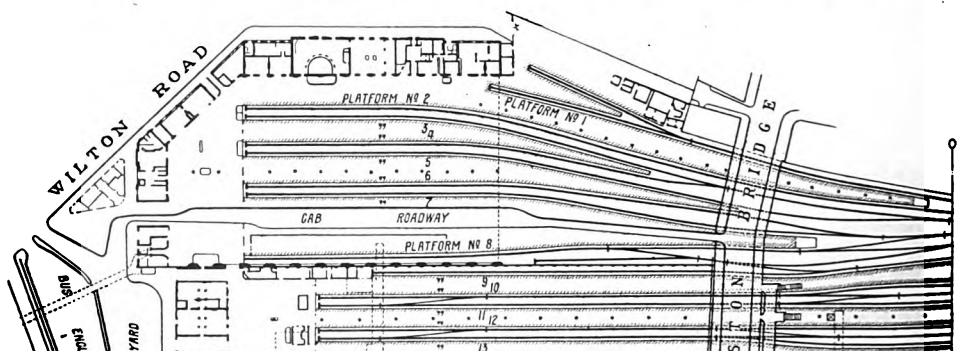
and indicated on the plan annexed to the conveyance, including not only that occupied by the Brighton Company's Victoria station, but also the land occupied by the whole of the Victoria station approach.

In 1861, by Act of June 28, half the station was leased to the London, Chatham and Dover, and Great Western Railways, which explains why the façade of the "Chatham" side bears in stone the words "South Eastern & Chatham and Great Western Railways." This also accounts for the fact that, until recently, Great Western local trains regularly worked into Victoria via Addison Road and the West London and West London Extension line, including, for a short period, through expresses from Birmingham to Victoria, and occasional special, milk and other trains. On the "Brighton" side, London and North Western trains also made use of the station, but by virtue of running powers, which are still exercised for milk, parcels, horsebox, theatrical, and other traffic, though, like the G.W. passenger trains, there are now no regular passenger services.

Under the Railways Act, 1921, the Victoria Station and Pimlico Railway was taken over by the Southern Railway, though the G.W.R. still retains part of its old interests, and the L.M.S.R. continues to exercise its running powers into the "Brighton" section, though not by booked passenger trains.

The original station was, of course, quite an ordinary one and of limited capacity, according to present-day ideas. It was, however, soon enlarged, and until the end of last century provided, on the Chatham side, nine platforms beneath an overall arched roof, and, on the Brighton side, eight platforms. The Chatham side



PLAN OF VICTORIA

1. Staff Lavatory.
2. Wash and Brush-up Room for Staff.
3. Service Room.
4. General Canteen.
5. Advance Registered Baggage Store.
6. Tea Room.
7. Refreshment Room.
8. Royal Waiting Room.
9. Clerks' Office.
10. Telegraph Office.
11. Baggage Office.
12. Booking Hall.
13. Booking Office.
14. Ladies' Waiting Room.
15. Ladies' Lavatory.
16. General Waiting Room.
17. Gentlemen's Lavatories.
18. Exit.
19. Inspectors and Station Foremen.
20. Cloak Room
21. P.O. Letter Box.
22. 3rd Class Refreshment Room.
23. Hall.
24. 1st Class Refreshment Room.
25. Kiosks.
26. Indicator.
27. Illuminated Time Table.

(*See also detail plan of*

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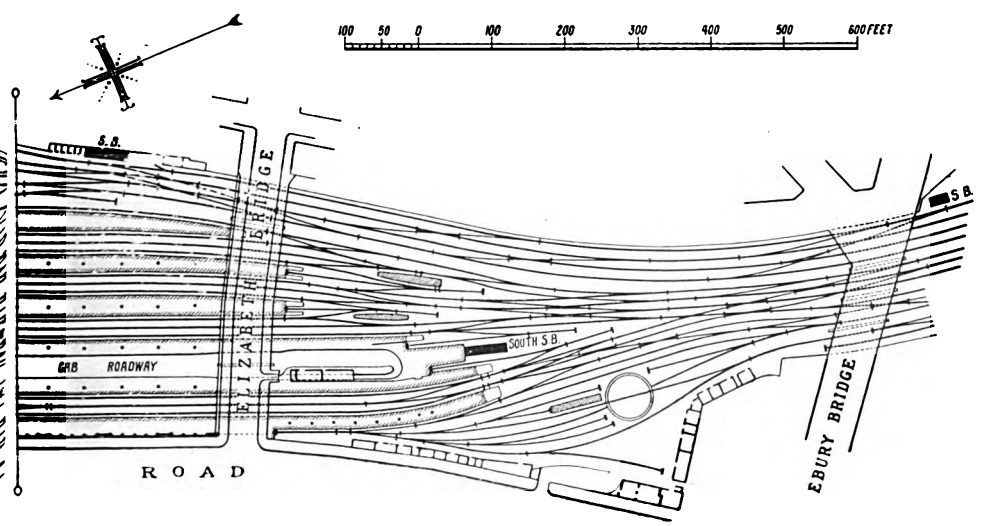
s not greatly altered, though in 1922 certain platforms were reconstructed in order to obtain greater platform area and to facilitate the working of the station. At various periods, however, a number of detail alterations were carried out, including lengthening of platforms under and beyond Eccleston Bridge, though, in general, this part of the station is very much as it was when built.

The Brighton station was, however, entirely rebuilt, the work being completed in 1908, and reference may be made to an article by Mr. Cecil J. Allen, describing it as a newly completed undertaking, in the October, 1908, issue of THE RAILWAY MAGAZINE. Like its neighbour, the old station terminated at Eccleston Bridge, but was extended to Elizabeth Bridge, several platforms going even farther. The difficulty was that transverse enlargement between the Chatham station and Buckingham Palace Road was out of the question, so that longitudinal enlargement afforded the only course available. The design adopted was an ingenious one, as while No. 1 (old numbers) was long enough to hold two trains simultaneously, and Nos. 8 and 9 could be so used if the trains were fairly short (none of these provided for independent access to the northern portions), centre lines were laid between the southern sections of Nos. 2 and 3, 4 and 5, and 6 and 7, so that trains could enter or leave the northern portions while the southern portions were occupied. This allowed for 15 trains in the station at once, each able to enter or leave the station freely; 16 if No. 1 was used for two trains; and 18 if Nos. 8 and 9 each accommodated two trains. To a great extent this user is still practicable, but now that long trains have become the rule, it often happens that trains in



STATION, SOUTHERN RAILWAY.

28. Bookstall.
29. Station Master's Office over (area shown hatched).
30. Proposed Site for Bank.
31. Subway to District Railway.
32. Inquiry Office.
33. Continental Office on First Floor, shown hatched.
34. Tobacco Kiosk.
35. Local Booking Office.
36. Ticket Collectors.
37. Guards' Room.
38. Station Store under.
39. Lavatories and Hairdresser under.
40. Main Line Booking Office.
41. Main Booking Hall.
42. Portion of Basement to be used as Customs Lock-up, shown hatched.
43. Labels.
44. Cases.
45. Main Line Refreshment Room.
46. Grill Room.
47. Chemists' Shop.
48. Refreshment Room Manager.
49. Daylight Examination Room.
50. Parcels Office (Customs' Offices on First Floor over).
51. Baggage Clerk under.
52. Workshop under.

Terminal Area on page 258.)

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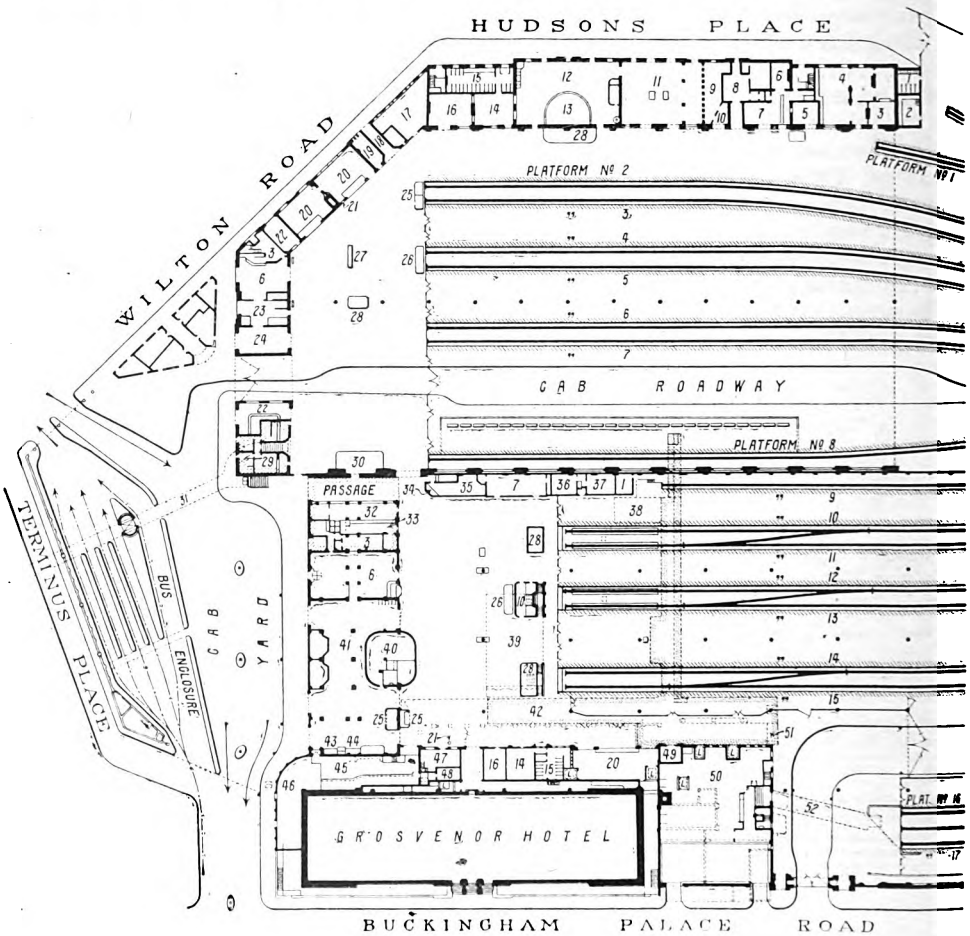
the northern portions extend beyond the crossovers adjacent to Eccleston Bridge, with consequent restriction upon the independent user of the southern portions. Not infrequently, however, trains are unloaded at the southern ends of platforms and then moved forward to the northern portions as soon as space is available. The drawback, too, is less serious than it seems, as for many passengers entrance or exit via Eccleston Bridge is a convenience.

When under different ownerships the two portions of the station were so distinct that to get from one to the other passengers had to proceed via the outside



PLAN OF STATION OFFICES.

(*See also plan and table of references on pages* 256 *and* 257.)

It is true that passengers thus arriving have to walk a whole train length forward to reach the barriers, and *vice versa* to reach an outgoing train which is being dealt with in the southern portion, but this is better than being kept outside the station waiting for platform space (with consequent delay to other traffic). It is, however, avoided as far as practicable. courtyard, while the passage way to the adjacent Metropolitan District station bifurcated at its southern end to serve one or other station. Indeed, there was no very great necessity for such intercommunication, as each station was an entity in itself, and the traffic of each had very little in common. The difficulty has, however, been remedied by the

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cutting of two passage ways through the dividing wall, this being useful for staff as well as for passengers, and is further desirable in view of the fact that one set of station master's offices now suffices for the whole station, the Enquiry and Continental offices are operated as applying to the whole station, and passengers have the free use of station offices, refreshment rooms, buffets and restaurants, cloakrooms, &c., throughout the station premises.

Victoria station is bounded on the western side by Buckingham Palace Road, and extends from the Grosvenor Hotel past Eccleston and Elizabeth Bridges virtually to Ebury Bridge, which represents the practical limit of the station area. Except for the hotel, the whole of this side is handsomely walled, with a stone archway for the cab exit on the Brighton side, and stonework adjacent to the parcels roadways on the same side, and at the corners of Eccleston and Elizabeth Bridges. On the other side, however, except at the Wilton Road corner, and past the courtyard of the Eastern Section booking hall and the Continental department and Pullman Car Company's premises, the station area is usually bounded by the backs of houses in adjoining streets.

In front, there is a spacious courtyard, recently equipped as a well-designed omnibus station, the starting point for quite a number of L.G.O.C. services in all directions. Buses arrive from Buckingham Palace Road opposite Grosvenor Gardens, and enter the portion of the station yard reserved for them via Terminus Place. The latter thoroughfare continues outside the station boundary past the "Underground" station. Between the omnibus station and the main station is a wide space, partly covered, for cabs bringing arriving passengers to the Brighton section. Farther along, adjacent to Wilton Road, is a stone archway for cabs leaving the Eastern Section station. Departure traffic cabs from the Brighton side thus use the front of the station, and arrival traffic cabs the Buckingham Palace Road exit already mentioned, while departure traffic cabs from the Eastern Section use the side courtyard off Wilton Road, arrival traffic cabs leaving from the front of the station. Slopes for empty cabs waiting for arriving passengers are provided from Eccleston Bridge for the Eastern Section and from Elizabeth Bridge for the Brighton Section.

Commencing from the Grosvenor Hotel, the principal station premises may be first described. In connection with the hotel are a public restaurant and grill room, and adjoining is a section for dealing with baggage registration for Continental traffic via Newhaven and Dieppe and excess luggage. This is on one side of a very fine booking hall, which includes, on the courtyard side, fruit and flower shops between the doorways and, opposite thereto, a large oval booking office located between openings leading to the circulating area. This booking office, which has six windows in the booking hall, extends into the circulating area, where four further windows are provided, together with a small office for the sale of season tickets. Beyond the booking hall is a large tea room and lounge, and, alongside a wide passage way, in line with stairs from the subway from the "Underground" station, is a General Enquiry Office, with Continental Enquiry Office above, where as many as ten or twelve clerks are often required to deal with the numerous and widely varying enquiries.

The eastern wall of the passage way mentioned constitutes the old boundary between the two stations, though two openings, one wide, now allow of through movements. To the left of the circulating area, looking south, may be noted a large suburban booking office, and, beyond, a general refreshment room, with staff offices extending on to Nos. 9 and 10 platforms.* Behind the buffer stops of Nos. 10 and 11, also of Nos. 14 and 15, are large bookstalls, and behind those of Nos. 12 and 13 is the Post and Telegraph Office. In the middle of the circulating area is a large train indicator, which will shortly be replaced by an improved indicator to be erected against the wall of the telegraph office, while here and there are kiosks and trade exhibit cases. Alongside No. 15 platform is a direct entrance to the Grosvenor Hotel, a buffet, waiting-rooms, left luggage, parcels offices, and cloakrooms. A space is barriered off from No. 15 platform to serve these departments,

* These are the new numbers now employed from one side of the combined station to the other.

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extending as far as the cab road between Nos. 15 and 16 platforms and the exit therefrom to Buckingham Palace Road. The parcels department has entrance and exit openings from and to Buckingham Palace Road, as well as from the concourse, collection and delivery vans backing to a platform on the staff side of the parcels department premises. Gates across the cab road enable Nos. 15 and 16 platforms to be barriered off, as in the case of other platforms.

On the Eastern Section side, in the corner are the stairs from the passage way from the "Underground" station, the entrance to the station master's offices (on the level and above), and the Continental baggage office whence arriving passengers who have not taken their luggage with them can fetch it at convenience. These premises are somewhat cramped, and a new luggage hall for this traffic is in course of construction in the basement of the Brighton side of the station. This will communicate with a hoist between Nos. 7 and 8 platforms, while a conveyor to be installed will provide for horizontal transit between platform and store. A public stairway to the latter is included in the scheme.

Alongside is a cab road for arrival traffic in the Eastern Section of the station, with gateways enabling the platforms to be barriered off. This cab road passes through the archway previously mentioned. Adjoining, on the courtyard side, is a public buffet, entrance to the Pillar Hall restaurant, and a tea-room. Owing to the lay-out of an adjoining thoroughfare, the boundary of the circulating area continues at an angle to the premises alongside No. 2 platform. Along the angular portion may be noted a refreshment-room, cloak-room, and luggage department premises. Next is a somewhat narrow passage way providing for exit to Wilton Road, the buildings then continuing parallel to No. 2 platform and including a series of waiting-rooms, the main booking hall, with two openings on the platform side, between which is located the main bookstall, a Continental baggage registration office (this is being extended in view of the fact that the handling of Continental luggage has become so big a factor), and Royal waiting-rooms. The latter are in fairly frequent use by members of our own Royal Family and the large number of foreign royalties and official representatives of other countries who arrive at, or depart from, Victoria station in the course of a year. From the station side there is a well-finished corridor leading to the main waiting-room, a beautifully furnished apartment decorated in white and gold, while a further corridor leads to the station courtyard. On one side is a private waiting-room for the use of Her Majesty the Queen. Both this and the main waiting-room are adorned with a number of framed engravings and pictures of various Royal personages or otherwise of appropriate interest. Beyond the Royal waiting-rooms may be noted another refreshment-room and staff offices.

Until recently, the platforms on this side of the station terminated unevenly, but in order to facilitate public movements, and in view of the very large numbers of passengers assembling at holiday times and on summer Saturdays, certain platforms were shortened in 1925, so that all except No. 1 now terminate in line. This adds considerably to the circulation space, which is interrupted only by stands for train announcement notices (to be replaced by a modern indicator), with a small bookstall and with confectionery kiosks behind the buffer stops of certain lines.

Apart from the present platform No. 1, which is provided on the eastern side of the outer portion only of main platform No. 2, the following was the arrangement of tracks prior to 1922 (using present platform numbers): No. 2, Middle Road, No. 3, No. 4, Middle Road, No. 5, No. 6, No. 7 and No. 8, with the peculiarity that Nos. 6 and 7 lines had platform faces on each side. By doing away with the middle road between Nos. 4 and 5, and reconstructing the platforms, Nos. 4 and 5 and 6 and 7 are both now in pairs between platform faces in the usual manner, with the advantage that a comparatively wide platform space is provided between Nos. 5 and 6.

The present numeration of platforms was introduced recently, in view of the organisation of the two portions of the

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station for operation as one, and the normal allocation of traffic in the Eastern Section side is that No. 2 is the principal main-line departure platform, mostly used for Continental services, while No. 1, though appreciably shorter, is long enough to take all but the heaviest trains, so that frequently, if two portions are run, as is often the case for a given Continental service, one portion will occupy each of these platforms. Nos. 3 and 4, being comparatively short, are used for ordinary services, including the electric services now operated on this side of the station, while Nos. 5 and 6 are principally employed for Kent Coast and other main-line services. Between Nos. 7 and 8 is the main cab road, to serve which an inclined roadway, built in concrete, has been erected, leading from Eccleston Bridge. No. 8 may be regarded as the principal arrival platform, in that barriers are provided to meet the needs of Customs officials dealing with luggage arriving by Continental trains. In practice, however, both Nos. 7 and 8 are equally important in this respect, while, as need arises, both may be utilised for trains other than Continental, while, now and then, it is necessary to bring one portion of a Continental service into another platform. Indeed, as throughout the station as a whole, every platform can be, and is utilised more or less regularly for both arrival and departure traffic, though considerations such as those indicated govern the choice of platforms so far as selection is practicable.

Beyond this side of the station the various tracks lead out to the carriage sidings on the east of the line beyond station limits and north of Grosvenor Bridge, while the running tracks settle down to two down and two up to cross the river, with an empty carriage or engine line across the bridge on the down side. One down and one up line only are equipped for electric traction, and conductor rails are laid at platforms Nos. 3, 4 and 6. Beyond No. 8 there is a transfer siding, this providing the only means of inter-communication with the Brighton Section, which is still, for train movement purposes, necessarily operated quite distinctly and separately from the Eastern Section station.

In the Brighton station the old No. 1 platform is now No. 9, so that platform numbers throughout the station extend from 1 to 17. No. 9 is adapted to berth two trains simultaneously, but as there is no avoiding line through the southern portion, a train at the north end cannot arrive or leave while the south end is occupied. In the southern portion a middle line is laid between Nos. 10 and 11, 12 and 13, and 14 and 15, so that a train can reach the north end of any of these platform lines or leave while the south portion is occupied by a train, and it is only the fact that so many trains are now made up to lengths which extend beyond the cross-overs adjacent to Eccleston Bridge that prevents the use of each of these platforms to accommodate two trains simultaneously. The traffic facility thus afforded is, however, freely utilised in the case of trains whose length is not too great, both steam and electric, and it is sometimes practicable to bring a second train into a platform already partially occupied, even although one train cannot then be moved until the other has been taken away. A cab road is provided between Nos. 15 and 16, reached by a cab slope from Elizabeth Bridge. Nos. 16 and 17, although of considerable length, are not long enough to accommodate two trains simultaneously (except, perhaps, two short ones), so that the intermediate cross-overs are not used for passenger trains. They have, however, ample length to accommodate the longest trains operated on the Brighton section, for which reason they constitute, in conjunction with No. 15, the principal arrival platforms, though, as is usual throughout the station, they are often utilised for departures.

In view of the fact that the Brighton station was completely rebuilt barely twenty years ago, the general suggestion is one of cleanliness, convenience, and spaciousness, attributes which are supported by the high gable roof in five spans, supported by comparatively slender columns. This suggestion does not apply quite so much in the southern section, as the roof sections between Eccleston and Elizabeth Bridges are somewhat differently designed, so that that portion of the station seems to be rather dark as compared with the northern portion, though it is designed on similar lines. Alongside Eccleston Bridge an

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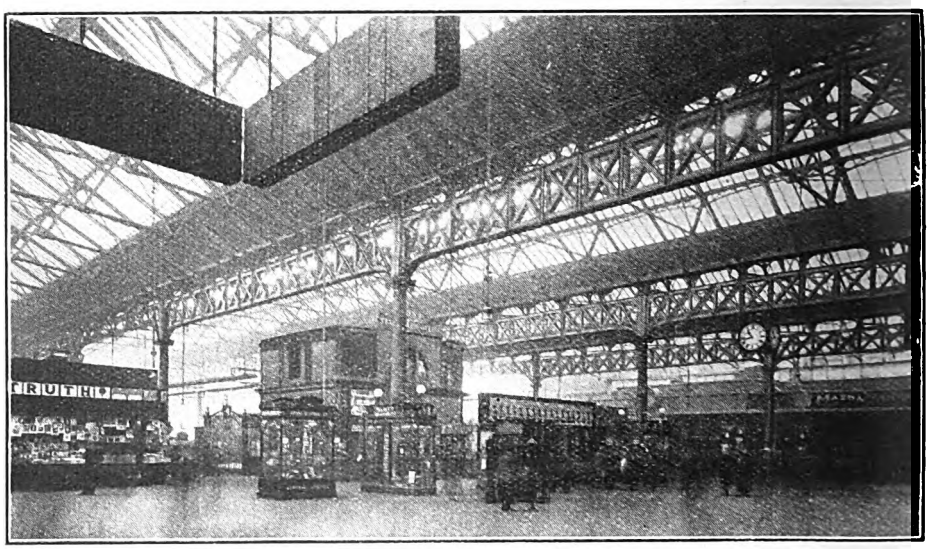
interchange footbridge crosses this portion of the station, and there are several gateways giving access to Eccleston Bridge, though one only is generally in use to enable arriving passengers to leave the station there instead of walking through to the main circulating area. There is, however, no booking office provision on the bridge, so that it can only be used by ticket holders for entrance or exit.

While Nos. 9 to 14 platforms terminate at or under Elizabeth Bridge, No. 15, and particularly Nos. 16 and 17, extend an appreciable distance beyond. Between the ends of Nos. 15 and 16 there are two engine siding docks, between which the main (south) signal cabin is placed. At the back of No. 17 is a loading bank, while just beyond is the engine turntable and a series of spur lines for standing engines. There are also engine docks, with coal stages, between Nos. 11 and 12, and 13 and 14 platforms.

Beyond station limits all running lines connect with four main tracks to cross Grosvenor Bridge. There is, however, an either-direction carriage road on the western side, which also crosses the bridge as far as Battersea, so that the track lay-out is down local, up local, down main, up main, and carriage road. Except for carriage sidings which extend almost to the river bank, but on the level instead of on an ascending gradient, as is necessarily the case with the through lines, this is the lay-out from the point where the railway is crossed by Ebury Bridge, which thus constitutes the practical limit of the station area. All four running lines across the bridge are now equipped for overhead electric traction, while, in the station itself, Nos. 9, 10, 11, 12 and 13 have the necessary overhead wires. Speaking generally, the allocation of platforms is as follows: Nos. 9 and 10, electric trains, South London, Crystal Palace and associated routes; Nos. 11 and 12, Coulsdon North and Sutton electric trains. No. 13, steam-operated suburban and other services; Nos. 14 and 15, principal main-line steam trains; and Nos. 16 and 17, principal main-line arrivals, though trains for almost any steam route, whether express or not, may be booked to leave any platform from No. 12 upwards, or may arrive at or depart from any platform.



CENTRAL SECTION CIRCULATING AREA.

Signalling at Victoria possesses many features of interest, not the least being that each section has an essentially different system. Thus, in the Eastern Section the signalling is all-electric three-position, using plant supplied by the

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British Power Railway Signal Co. Ltd. Four cabins are concerned. The largest is "A" cabin, located on the down side just beyond the end of No. 1 platform. This contains 129 levers. A short distance farther on, at the point where the carriage sidings diverge, is "B" cabin, having 41 levers. Two further boxes are under the jurisdiction of the Victoria station-master, so far as this side is concerned, these being Grosvenor Road "B" cabin on the north side of the river (14 levers), and Battersea Pier "B" cabin on the south side of the river (22 levers). Both the last-mentioned boxes are mechanical. Signals are, as already mentioned, of three-position type, with upper quadrant arms, though in some cases two positions only are used. At suitable places route indicators are utilised. Dwarf signals, having signal arms painted on circular-disc faces, are used for shunting purposes, these also being of three-position design, whether three indications are used or not. The points are all electrically operated, and there is very complete track circuit and other control equipment, while the power frame in "A" station cabin has, of course, miniature levers and interlocking gear, with eye-ball diagrams. Beyond "A" cabin, towards Grosvenor Bridge, some of the signal combinations necessarily include ordinary mechanically operated semaphores, with or without distant arms, to cover the change from power to ordinary signalling. The power and battery-house for the electric signalling is located a few yards south of "A" cabin.

On the Brighton side, the signalling dates from the reconstruction of the station in 1908, and is based upon a system developed by the W. R. Sykes Interlocking Signal Company, in which the majority of the point levers are mechanical and the signals electrical, many being of the now well-known banner type introduced by the Sykes Company.

Photo.] CIRCULATING AREA, EASTERN SECTION. [*Topical.*

The usual arrangement is that ordinary levers are used for the points, arranged in one long frame as usual, while above are small slides for the electrically-operated signals. While main signals are generally of semaphore type, working in the lower quadrant, not only shunting and siding, but also some of the running signals, notably those controlling movements past the cross-overs midway of the station, are of banner type, some of these working in the upper quadrant or even to the right instead of to the left, so as to obtain clearness of indication where groups covering a variety of movements are concerned.

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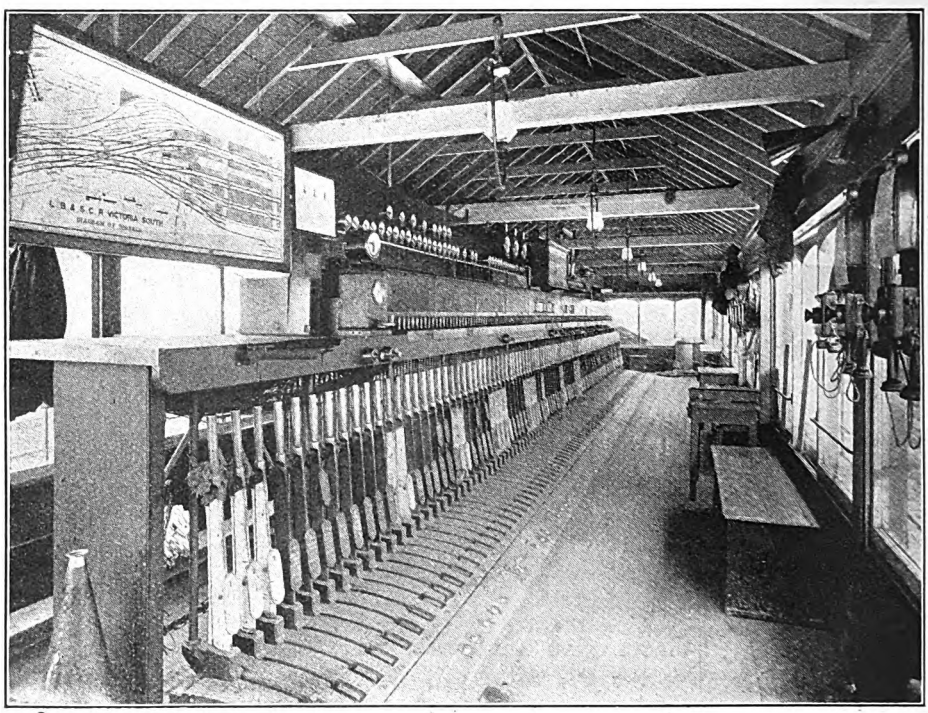
Three cabins are principally concerned in the work of the station proper. The chief is the South box, located between the ends of Nos. 15 and 16 platforms; it has 106 levers and 163 slides. In the middle of the station is the North box, between platforms Nos. 13 and 14, just beyond Eccleston Bridge, and concerned more particularly with inner station operation. This has 19 levers and 87 slides. The shunting cabin (11 levers and 11 slides) deals chiefly with movements to and from the carriage road and in the carriage crossing Grosvenor Bridge are first governed by a series of signals mounted on a gantry just south of Ebury Bridge. These cover the routing of traffic to one or other of the four sections into which the station is divided, there being four dolls for the up local line, three for the up main, and three for the carriage line. These constitute, in effect, outer home signals. That they do not indicate individual platforms is due to the fact that the inner home signals which give this information are located in the midst of the various



VICTORIA SOUTH CABIN, CENTRAL SECTION.

sidings, for which reason it is located close to Ebury Bridge. Three other electro-mechanical cabins are under the jurisdiction of the Victoria station master: Grosvenor Road "A," on the north side of the river (6 levers, 27 slides); Battersea Pier "A" (11 levers, 29 slides); and Battersea Park Junction (23 levers, 50 slides), south of the river. The Victoria station master also has control of one cabin still farther out, that at Pouparts Junction (35 levers).

Trains entering Victoria station after crossings and inter-connections, so that although a driver when passing Ebury Bridge is only informed as to the section he is entering, he gets the further information before he reaches any platform. The Ebury Bridge signals each have a calling-on arm which, when lowered, indicates that the full length of the platform is not available. The four sections above referred to are as follow: A—Nos. 9, 10 and 11; B—Nos. 12 and 13; C—Nos. 14 and 15; and D—Nos. 16 and 17. Apart from the extent indicated, the signalling at Victoria

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is very complete, and quite a number of special features, which need not be described, are incorporated. In this connection, we may refer to an article by Mr. W. E. Edwards, published in the December, 1908, and January, 1909, issues of THE RAILWAY MAGAZINE, while three-position signalling in the Eastern Section was described in March, 1920.

A few remarks must now be given in regard to the traffic dealt with at Victoria station, though for further details readers must be referred to the time-tables. In the Eastern Section the two chief factors are the Continental and the Kent Coast traffic. The principal Continental services are those at 8.10 (Fridays and Saturdays only during summer) and 9 a.m., via Folkestone and Boulogne; at 10 a.m. for Ostend via Dover; at 10.50 and 11 a.m., via Dover and Calais; at 2 p.m., via Folkestone and Boulogne, also to Ostend from Dover; and at 4 p.m., via Dover and Calais; with the corresponding services due in at Victoria at 10.13 a.m., 3.30, 4.30, 5.18, 7.15, 7.30, 8.40 and 10.50 p.m. Also the Gravesend–Rotterdam service at 5.40 p.m. Many of these service requires at least two trains, and not infrequently three or as many as six, one section being often made up entirely of Pullman cars. Most of these trains are moreover, heavy, so that although since the "King Arthur" class of locomotives have been introduced even the heaviest loads can usually be taken by one engine of that design, it is quite usual for trains worked by four-coupled locomotives to be double-headed. This traffic further involves a great deal of special station work, in view of the fact that so many passengers have a large quantity of luggage with them, while baggage registered through or handled after arrival at Victoria for Customs examination is a very big factor. Including the 10 a.m. and 8.20 p.m. services from the Brighton side to Newhaven and the corresponding trains due in at 6.5 a.m. and 6.43 p.m., the number of Continental trains dealt with at Victoria (mostly on the Eastern side) amounts to 24 or 28, with a record of 35, in one day; some idea of the magnitude and importance of this traffic will be gathered.

Of even greater magnitude, but involving a lesser degree of special handling and proportionately less luggage manipulation, is the Kent Coast traffic. This is at its heaviest during the summer months and at holiday periods. At such times an almost continuous service of trains is called for; so much so, in fact, that, of late years, it has been usual to advertise the services to and from Kent Coast stations as practically continuous and to provide trains at short intervals throughout the busy hours. Thus, a last summer public time-table showed express trains leaving Victoria on Saturdays for Kent Coast stations at 8.43, 8.55, 9.30, 9.40, 9.45, 10.10, 10.15, 10.20, 10.30, 10.55, 11.5, 11.10, 11.20, 11.30 a.m., 12.20, 12.30, 12.50, 12.55, 1.55, 2.10, 2.15, 2.35, 2.45, 2.55, 3.5, 3.15, and 3.20 p.m., not to mention trains via other routes during the same period, and during the rest of the day at reasonable, if less frequent, intervals. Quite a number of these trains would be scheduled for Margate or Broadstairs and Ramsgate only, while others would serve not more than one or two additional stations. With such a volume of traffic, which often calls for the allocation of three or four platforms at Victoria exclusively therefor, and a succession of trains, and engines running to and fro all day, it can readily be realised that at such times the Victoria station officials have by no means an easy task in sending everybody off in reasonable comfort and to time, and in handling the returning holiday-makers while other crowds are still departing. Frequently, too, much of this traffic has to be carried on while the station is also busy with Continental traffic and with traffic on other routes.

In the Brighton Section the situation may appear to be somewhat easier, as, in some respects, traffic is more evenly distributed. At the same time, a list of the South Coast holiday train departures could be compiled which would make a very good comparison with that set forth in regard to the Kent Coast resorts, except that a greater degree of distribution over the Brighton, Hove, and Worthing and other routes is involved. Speaking generally, there is a systematic service of trains at five minutes past nearly every hour from Victoria to Brighton, with fairly numerous trains interposed on Saturdays at 35 minutes past the hour (some also at 50 minutes) to which must

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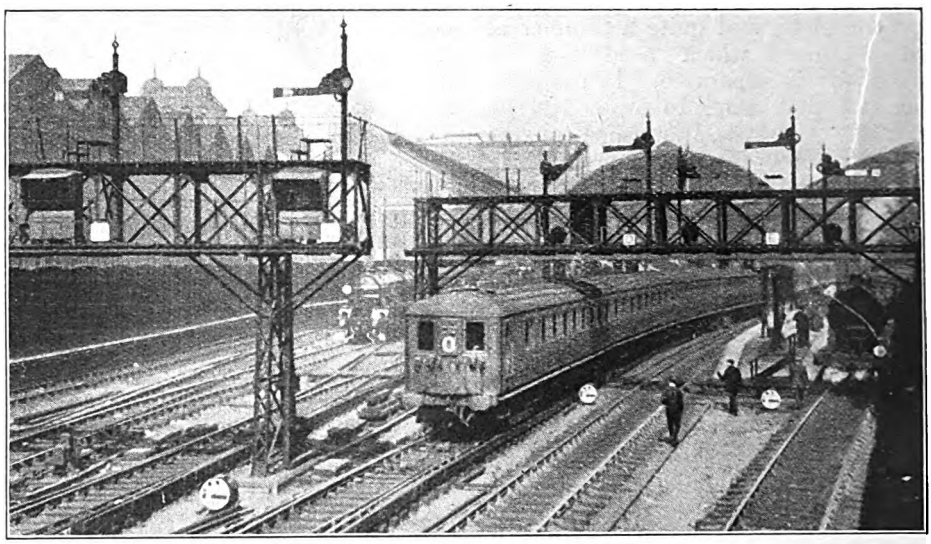

ELECTRIC TRAIN LEAVING EASTERN SECTION.

be added trains at 15 minutes past approximately every hour to Eastbourne, and at other suitable intervals for remaining routes. Besides the traffic via the Brighton main line and branches associated therewith, may be mentioned the numerous trains for Bognor, Littlehampton, and other places served by the Portsmouth route, there being a considerable amount of such traffic, notwithstanding that the diversion of so much of the Portsmouth and Isle of Wight traffic to Waterloo has relieved Victoria station to a certain extent.

While the traffic of an extreme character dealt with in both portions of Victoria station is associated with the summer months and holiday periods, important sections render the station quite busy practically all the year round. Thus the Continental traffic, while heaviest in the summer, is quite a big item during the winter, in view of the attractions of the Riviera season and of winter sports in Switzerland. Similarly, both the Kent and South Coast resorts account for a great deal of week-end traffic all the year round. On Sundays, too, both sides of the station are very busy throughout the summer, and only less so in winter in view of the special traffic conveyed on that day by such trains as "The Southern Belle," "The Eastbourne Limited," and "The Thanet Limited" Pullman Car expresses. On the excursion side, too, trains in large numbers are frequently run, both Sundays and weekdays in summer, and Victoria thinks nothing of sending off 40 or 50 such trains in the course of a day. Another important traffic is that involved by the special trains run for bringing boarding school children home for the holidays and back for the reopening of the school terms. Military, Territorial, Boy Scouts, Boys' Brigade, Girls' Life Brigade, and other traffic is a further big item, while race traffic is often a heavy and complicating factor.

On the electric side there is a 20-minute service of trains in the Eastern Section, while regular services at about 5-minute intervals on four or five different routes are operated in the Brighton Section. Besides passenger traffic, Victoria station also deals to a considerable extent with milk, fruit, and other special and seasonal traffics. Thus, in the early morning, several trains conveying milk traffic only are received from the West of England and sent out after remarshalling and frequently resorting of the churns as between the respective vans, with corresponding traffic for return empties. A

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certain amount of transfer, merchandise, perishable, and confectionery traffic is also handled. Fish is received in the early hours from Hull and Grimsby in considerable quantities and remarshalled for distribution to selected Southern Railway routes.

It will be gathered from the foregoing that the operation of traffic at Victoria station is far from being a simple matter, whether considered from the point of view of volume or in regard to complexity and the amount of handling involved. In large measure the efficiency realised—which has reached a stage whereby even on the busiest Saturdays it is regarded as a cause for close enquiry if the average lateness exceeds more than a minute or two—is due to the careful working out in detail of every train movement. Thus, for busy days, very complete schedules are prepared, showing what is to be done with every engine or set of vehicles after arrival, including instructions as to the movements of banking engines, assisting trains from the Eastern side as far as the Carriage Sidings Junction, and the disposal of engines and vehicles between duties. It is but rarely that any serious departure is made from the scheduled arrangements, and then chiefly because an odd train has failed to arrive in its correct order due, perhaps, to some traffic or engine difficulty down the line.

Naturally, so big a station requires a large staff, which totals 1,016, without counting some of the additional staff drafted there during the summer period. Mr. P. C. Hopper, M.B.E., has held the position of station master since February, 1914, having previously held corresponding positions at Ashford and Folkestone Harbour. Prior to that Mr. Hopper obtained a wide experience in the office of the Superintendent of the Line of the then South Eastern and Chatham Railway. He is assisted by three assistant station masters: Messrs. R. Allchin, W. Mepsted, and R. Skinner. The three assistant station masters cover between them early, middle, and late turns. The commercial side of the passenger traffic, including the charge of the booking offices, is under the passenger agent, Mr. W. Holkham, while Mr. G. Butler is clerk-in-charge of the Parcels Department. Attached to the station in various sections are about 100 clerks and 39 men supervising the work of 781 men of other grades. Ninety-two guards are attached to Victoria station, and while there come under the control of the station master. Signalmen number 36, with six signal lads and two porter signalmen.

MR. P. C. HOPPER, M.B.E.
Stationmaster.

In conclusion, the writer may express his indebtedness to Mr. E. J. Missenden. M.B.E., London (East) Divisional Operating Superintendent, and other officers of the Southern Railway, Mr. Hopper and the assistant station masters, to Mr. Parsons, chief clerk to the station master, and to various members of the staff at Victoria station, for material assistance in the preparation of this article and for facilities for observing the working of traffic under various conditions.

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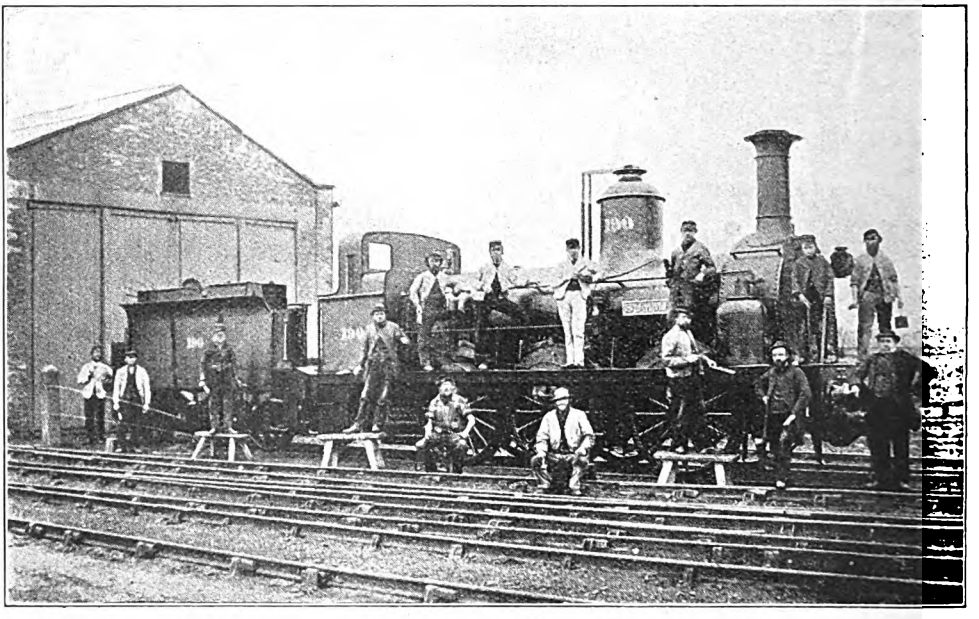
AT SHILDON IN 1870.



ENGINE 190—"SUMMER."

The old Stockton & Darlington Railway locomotive No. 190, *Summer*, illustrated above, was built at Shildon Works in 1870, under the direction of Mr. Wm. Bouch, engineer. It was painted at the Soho paint shed, which at that time held two engines. They were changed every Monday morning, after standing to dry over the week-end, and each engine was treated with two coats of varnish laid on after they had been rubbed from end to end with white tallow. An engine thus treated ran for eight or ten years if cleaned daily by the fireman. In those days both fireman and driver took great pride in their engines, because they were allocated to the same engine for years at a time. The photograph reproduced, was taken on May 8, 1870, at the shed door, with the full staff standing round. Besides locomotive painting, the apprentices at Soho were taught plumbing and home decoration. All classes of engines were painted green, wheels, spokes and rims lined, cab sides and tender panelled and lined. Altogether, they were very different looking locomotives from those at present in use. In those far-off days black paint to save engine cleaners' time was not thought of. The brasses in the cab shone like a mirror. Firemen vied with each other for the bonniest engine. But times are not now what they were in the '70's and '80's.

[From an article by Mr. R. O. Bowran, Yardmaster's Office, Shildon, published in the January, 1927, number of the *London & North Eastern Railway Magazine*.]

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Oldham and its Railways.

By HAROLD SEVILLE.

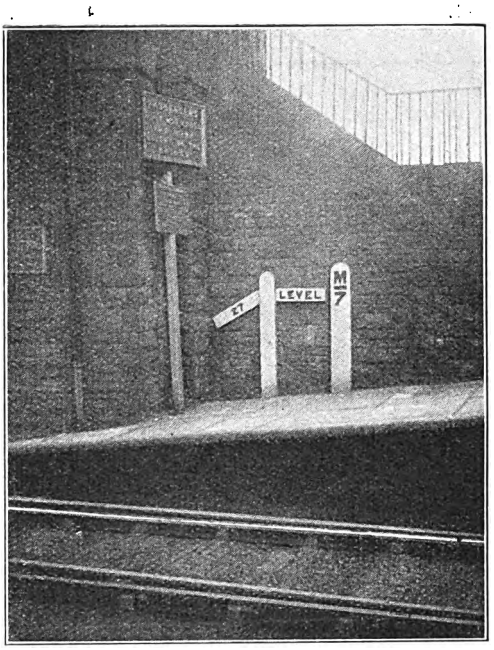

Photo.] [*H. Seville.*

1 IN 27 GRADIENT BOARD AT WERNETH STATION.

THE County Borough of Oldham (pop. 150,000), together with its satellites, the urban districts of Chadderton (pop. 30,000), Royton (pop. 17,500), Crompton (pop. 17,000), and Lees (pop. 4,500) in Lancashire; and Springhead (pop. 5,000) and Saddleworth (pop. 13,000) in Yorkshire; comprises the greatest cotton-spinning district in the world. There are situated in this area 247 firms operating some 17½ million spindles out of a total for all England of about 60 millions.

Needless to say, the railways have played a prominent part in building up this commercial eminence. The town is exceedingly badly placed from a transport point of view, as it is built mainly on the western face of an outlying spur of the Pennine range, and consequently has not been at all an easy place for the railways to reach. The lowest part of the borough, at Hollinwood, is about 360 ft. above sea level, while the highest, where the borough boundary is also the boundary between Lancashire and the West Riding, is well over 1,000.

To give some idea of the climb the railways had before them it may be pointed out that whereas rail level at Manchester (Victoria) is about 115 ft., the summit at Hartford sidings (Oldham) is about 630 ft.; as the distance between these points is about 7½ miles, a climb of 515 ft., or an average grade of 1 in 76, is entailed, while between Middleton Junction (343 ft.) and Werneth (525 ft.) the distance of 1¾ miles involves an average grade of 1 in 53·5. Hollinwood is 360 ft., the distance to Werneth 1⅝ miles, average grade 1 in 52. Mumps is about 615 ft., distance from Werneth 1 mile, average grade 1 in 51. The rise from Royton to Royton Junction is 1 in 63, and this grade also occurs on the line from Shaw and Crompton up to Royton Junction.

Similarly the Oldham, Ashton and Guide Bridge line rises all the way from Ashton, with the exception of a slight dip at Park Bridge, where it crosses the valley of the Medlock. It then rises from Park Bridge at an average of about 1 in 71. A similar climb, although not to such an extent, faces the branch from Greenfield, on the Stalybridge and Huddersfield line of the old London and North Western Railway.

As the Manchester and Leeds (late Lancashire and Yorkshire) Railway was the first

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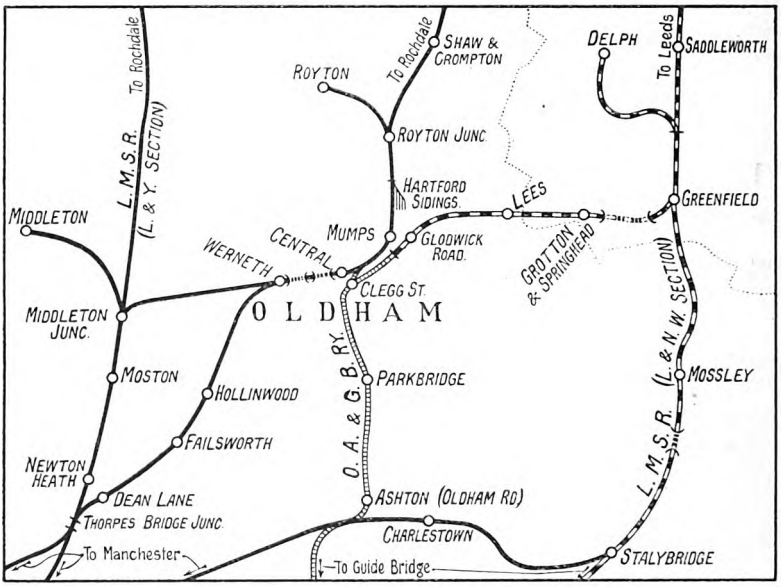

MAP OF RAILWAYS IN OLDHAM DISTRICT.

comer to the town, it will be convenient to deal with the Lancashire and Yorkshire group of lines of the L.M.S. system first.

On March 31, 1842, the Oldham branch of the Manchester and Leeds Railway was opened. This branch left the M. & L. main line at Middleton Junction and terminated at Werneth, close to the Manchester—Oldham turnpike, also the Featherstall Road connecting with Royton, Shaw, Rochdale, &c. This was, no doubt, in those days considered a convenient site. From the opening of the Manchester and Leeds line, all Oldham traffic had been dealt with at Mills Hill station, a distance of over 2 miles by road from Oldham. This station also served Middleton, as it was situated on the Oldham-Middleton high road. It is now, and has been for many years, closed, though certain of the original station buildings are still standing and are occupied as dwellings.

The Oldham branch curves off rather sharply in a northerly direction and, after climbing gradually for 1 mile, suddenly steepens to the famous Werneth incline of 1 in 27 for the remaining three-quarters of a mile. The idea apparently was as far as possible to save expensive embankments and to follow the natural ground contour. Had the line been built on an embankment, this very severe gradient would have been considerably eased. This grade continues right up to the platform at Werneth station, so that all trains from Middleton Junction necessarily enter the station with the regulator full open and going "all out" at a speed of only 10 m.p.h. or thereabouts.

At first this incline was worked by cable haulage, but this method was eventually abandoned, as it was discovered that the engines were capable of tackling the bank unassisted. According to Normington (History of the Lancashire and Yorkshire Railway), Mr. William Hirst (afterwards locomotive superintendent), accompanied by some of the directors, travelled on the first engine to ascend the bank unassisted in June, 1851. The engine was No. 151.

In 1855, Mr. Jenkins designed the first "Oldham Tanks" specially for this service; they were 0-6-0 saddle tanks. None the less, there are many tales told of trains coming to a stand, owing to the engines running "short of breath," and having to set back and try again.

Up to 1880 the whole of a heavy inter-urban passenger and goods service had to be worked over this difficult line, and one can imagine what this must have entailed. Nowadays the branch is of secondary importance, as most of the traffic is now worked by alternative routes, and the trains used are generally 3-coach bogie sets which maintain a shuttle service between Middleton Junction and Rochdale via Shaw, though some terminate at Oldham (Mumps). There is a present-day service of 16 trains in each direction, which are arranged to form connections at Middleton Junction with trains to Heywood, Bury, Middleton, and Yorkshire stations.

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It was early discovered that Werneth was not a convenient terminus, as it was down in a dip and was, moreover, about three-quarters of a mile from the centre of the town, so that not many years elapsed before the line was carried forward through two short tunnels to Central and Mumps stations. Mumps is the principal station in Oldham on the L.M.S. (L. & Y. section) line; it takes its extraordinarily ugly name from a contiguous thoroughfare. This line was opened in November, 1847.

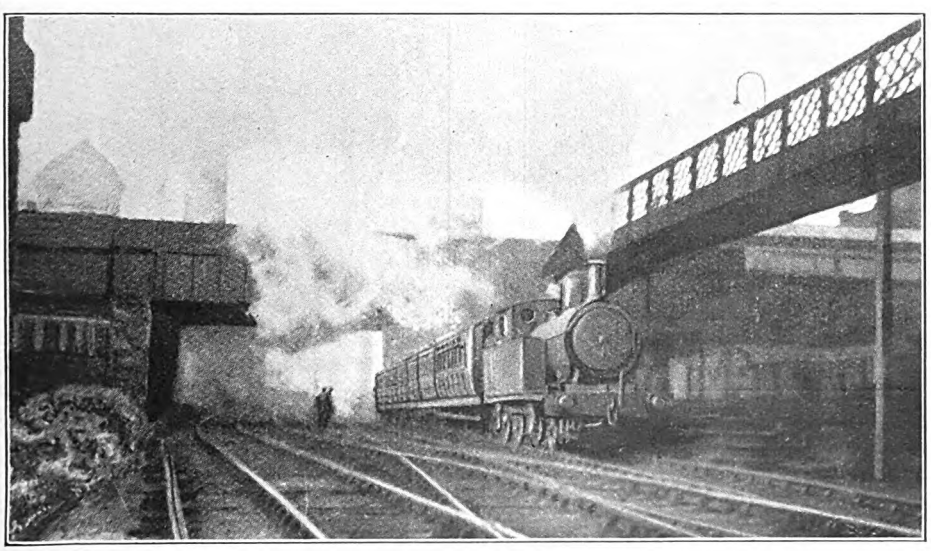
Exactly 16 years later, in November, 1863, this line was extended to Rochdale, with intermediate stations at Royton Junction, Shaw (afterwards Shaw and Crompton), Newhey, and Milnrow, with a branch from Royton Junction to Royton.

During the 1863–80 period, Oldham had been growing amazingly, particularly in a south-westerly direction, following the line of the Manchester-Oldham turnpike. This factor, coupled with the rapidly increasing traffic, which was not only becoming altogether too much for the Werneth line, but was also causing serious dislocation to the main-line traffic between Manchester and Middleton Junction, caused the directors to decide on an entirely new route for Oldham traffic; consequently, on May 17, 1880, the Hollinwood branch was opened. This, although always known as the Hollinwood branch, is not a branch at all, but a cut-off, 4 miles 6 chains in length, leaving the main line at Thorpes Bridge Junction, Newton Heath, and rejoining the original Oldham branch, just west of Werneth station.

There are intermediate stations at Dean Lane, Failsworth, and Hollinwood; it climbs the whole way, the steepest grade being 1 in 50 from Hollinwood to Werneth. It is formed in cutting from Dean Lane to Failsworth and from thence to Werneth on a high embankment. This line was a godsend to both passengers and to the harassed staffs at Manchester, and particularly Middleton Junction, as it enabled a vastly improved service of trains to be given.

The present-day service consists of about 48 trains in each direction between Oldham and Manchester (Victoria), operated by the well-known 2-4-2 tank engines. These tackle the severe banks in great style. Mr. Hughes' 4-6-4 express tanks are now used for some of the heavier trains in the "rush" hours. The trains are usually 5, 6 or 7-coach bogie sets (wide stock), and the times are very smart considering the numerous stops and severe gradients.

In the early 'nineties, when the writer used the line daily, the trains consisted generally of six-wheeled "Wolverton" stock, worked by Mr. Barton Wright's 0-6-2 tanks, occasionally varied by the appearance of his 0-4-4 tanks, though Crewe-built DX goods engines and Mr.



TRAIN ASCENDING 1 IN 27 INCLINE APPROACHING WERNETH STATION.

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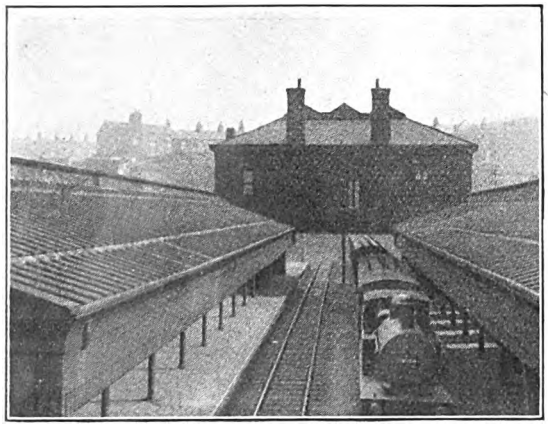
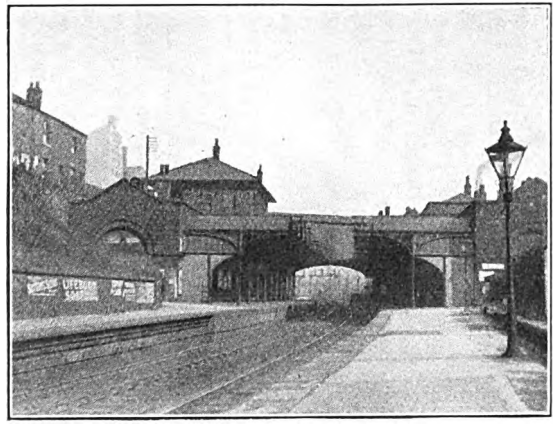
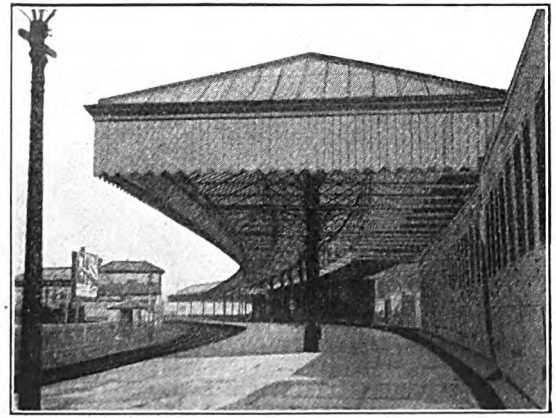
WERNETH STATION.





CENTRAL STATION.

MUMPS STATION.



CLEGG STREET STATION.

Photos.] VIEWS OF OLDHAM STATIONS. [*J. F. Gairns.*

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Wright's "Ironclads" were also to be seen.

Very few of the trains terminate at Oldham, most of them going on to Royton or Shaw and Rochdale. The service from Oldham to Royton consists of 23 trains each way; Oldham to Shaw, 28; and Oldham to Rochdale, 22. It is anticipated that this group of lines will be electrified in due course.

As may be expected, a large amount of raw cotton comes into this district and very ample storage has been provided. Large warehouses have been erected at Middleton Junction, Werneth, Mumps, Hartford sidings (between Mumps and Royton Junction), Shaw, Royton and Hollinwood; those at Werneth, Royton and Shaw are specially notable. Large mineral yards are provided at all the above points, also at Royton Junction, Failsworth and Chadderton. The latter yard is on a branch from near Middleton Junction, opened just before the war.

At Werneth and Hartford are the two large works of Platt Brothers & Co. Ltd., the largest textile machinists in the world, who normally employ upwards of 12,000 hands. Both works are directly connected with the railway, a smart stud of standard gauge yard engines working on the private lines. They are all 0-4-0 saddle tanks with very short wheelbase, named after local towns, such as "Shaw," "Royton," &c. They are all, except one, of Messrs. Hawthorn Leslie's make, painted red, and are always maintained in spick and span condition. Messrs. Platt are also owners of collieries at Milnrow and Shaw, and at the latter pit have coke ovens in addition. The pit at Shaw is directly connected with the railway. Messrs. Platt Brothers have an arrangement with the railway company whereby they work their own material trains between their old works at Hartford and their new works at Werneth.

Other concerns directly connected are the Oldham Corporation Gas Department at Higginshaw, on the Royton branch and at Greaves Street, near Central station; Messrs. A. & A. Crompton, cotton manufacturers, at Shaw; and the Co-Operative Wholesale Society at their preserve works at Middleton Junction, where they employ a smart little "Avonside" saddle tank.

The next line to enter Oldham is now also L.M.S. property. This is the Oldham branch of the old London and North Western Stalybridge and Huddersfield line. This was opened in July, 1855; it leaves the main line at Greenfield in the West Riding of Yorkshire, climbs to the Lydgate tunnel, enters Lancashire, and runs due west, through Grotton and Springhead and Lees, to its original terminus at Glodwick Road. From Greenfield another branch, single line, curves off in a north-westerly direction to the small manufacturing village of Delph, situated amid romantic and almost mountainous surroundings, as yet hardly spoilt by manufacturing processes.

Twenty years ago the Oldham-Greenfield-Delph service was something of a by-word, until the company introduced a motor service and opened halts at Moorgate, Grasscroft and Dobcross, at the same time putting on a much improved service. The result has been the great development of this area as a residential district, many Oldham business men having built houses in the neighbourhood. There are now 36 trains each way between Oldham and Greenfield, and 19 each way between Oldham and Delph.

There are no through trains between Oldham and Huddersfield and Leeds, passengers for these towns having to change at Greenfield. There is a large cotton warehouse at Lees, and goods yards at both Lees and Grotton; at Lees there is also a locomotive depot which is subsidiary to Longsight (Manchester).

We now come to the line which brought the old Manchester, Sheffield, and Lincolnshire Railway into the town, namely, the Oldham, Ashton and Guide Bridge Junction Railway. This company was incorporated on August 10, 1857, to construct a line from Glodwick Road to Ashton, and to join the M.S. & L. line at Guide Bridge Junction. It was opened on August 26, 1861, the total length being 6¼ miles. There are intermediate stations at Oldham (Clegg Street), Ashton (Oldham Road) and Park Bridge. On June 30, 1862, it was leased to the London and North Western and Manchester, Sheffield, and Lincolnshire Railways, and from that date has been worked as a joint line. As regards the Oldham-Guide Bridge

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shuttle service, the M.S. & L.R. (later G.C.R., now L.N.E.R.) has always provided the engines and coaches. The present-day service is 12 trains in each direction; these connect with L.N.E.R. main-line services to Sheffield, Nottingham, Grimsby, &c., at Guide Bridge.

The O.A. & G.B.R. project was strongly supported at its inception by the M.S. & L. people, as it gave them an entry into Oldham, and though the passenger traffic is not remarkably remunerative, a very heavy coal traffic from the Barnsley and other South Yorkshire pits is normally operated. The O.A. & G.B. line is a tenant at Glodwick Road, where a single platform is provided for them, but is the owner of Clegg Street, which is the principal station. This was rebuilt and remodelled some years ago and boasts a refreshment room, being the only station in the town to do so.

There is a large cotton warehouse at Clegg Street, but it is the property of the L.M.S.R. (L.N.W. section). It is a curious building, the lie of the land having forced the architect to lay it out on a curve, so much so that one end of the building is almost at right angles to the other.

At Park Bridge a long and lofty viaduct carries the line over the valley of the small river Medlock, and there are here also the extensive ironworks and bar rolling mills of Messrs. Hannah Lees & Sons. They are connected with the line, and have in use a queer-looking 0-4-0 inside cylinder saddle tank built by Beyer, Peacock & Co. Ltd. in 1889.

On this line also, at Ashton, were formerly situated the famous works of the late Isaac Watt Boulton, though these works are no longer used as a locomotive establishment. Just before entering Guide Bridge a line goes off to the right and joins the Droylsden-Denton-Stockport line of the old L.N.W.R. By means of this spur a service of trains is operated between Oldham and Stockport, and there are 12 trains in each direction. Some of these have through coaches between Rochdale-Oldham and London (Euston), which are attached to the Manchester-Euston trains at Stockport.

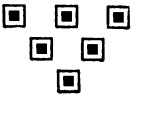
Between Central and Mumps (L.M.S.-L. & Y.) and Clegg Street and Glodwick Road (O.A. & G.B.) the two lines run side by side, and here a junction exists known as Oldham Junction, which allows trains to cross from the O.A. & G.B. line to the L. & Y.; this is used by the through Rochdale-Stockport trains mentioned above.

At Waterloo sidings, between Glodwick Road and Clegg Street, connection is made with the Corporation Electric Works at Greenhill, and at Glodwick Road there is another large cotton warehouse, the property of the L.M.S. (old L.N.W.R.).

As might be expected, Oldham, not being on any main line, none of the town stations are large, being generally speaking fair specimens of the suburban type. Clegg Street is the largest, having one island platform and a single-sided platform.

Mumps is an island with a single-line bay at each end. Central is modern and convenient, but Werneth and Glodwick Road are both rather dismal stations, being built in deep cuttings.

The Lancashire and Yorkshire section of the L.M.S.R. is remarkable in having a multiplicity of loops, forks and spurs, giving alternative routes. This peculiarity becomes exceedingly useful at Whitsuntide, and at the annual "Wakes" holidays, in that it allows of excursion trains to Blackpool, Southport, &c., being worked in either direction, so that the numerous "specials" required can be worked either way, this traffic being operated with equal facility via Manchester or via Rochdale, Bury and Bolton. Thus one series of trains start at Royton Junction, calling at Mumps, Central, Werneth, and Hollinwood, and the other series start at Hollinwood, and call at the same stations in the reverse order.



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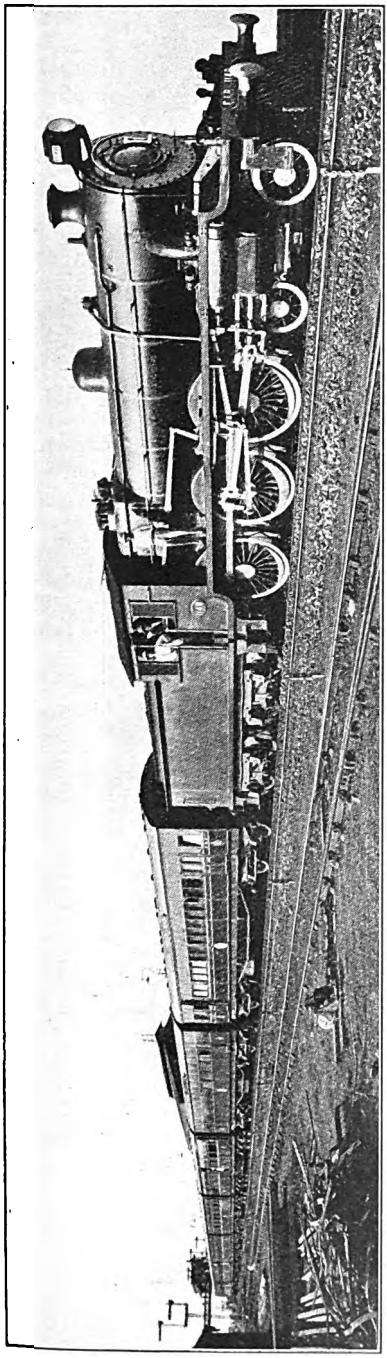
Imperial Indian Mail Train, East Indian and G.I.P. Railways.



GENERAL VIEW OF IMPERIAL INDIAN MAIL TRAIN.

TWO new trains, known as the "Imperial Indian Mail," have been placed in service, one by the East Indian and the other by the Great Indian Peninsula Railways, for service between Bombay and Calcutta, in conjunction with the Peninsular and Oriental Steam Navigation Company.

The East Indian train, shown in the accompanying illustrations, consists of one mail van, two sleeping cars, one dining and parlour car, one luggage, guard and kitchen car, and one sleeping, guard, and kitchen car. The bodies have "turn-over" sides, and the ends of the vehicles are streamlined in order to enhance the appearance and to keep within running dimensions when the vehicles are traversing curves. The interior finish is plain, but polished teakwood gives a solid appearance, and the elimination of corners, gentle curves taking their place, effectively prevents dust collection. The sleeping and dining cars are panelled outside with "Sundeala" millboard, supplied by G. D. Peters & Co. Ltd. This material is extensively used for rolling-stock at home, but this is believed to be the first application for exterior panelling in a tropical country.

The compartments are of three types. There are single-berth compartments, double-berth compartments with upper and lower bunks, and compartments with two lower berths. Each compartment has a washstand which, when closed, provides a useful table, and the single compartments, and those provided with upper and lower berths, are fitted with wardrobes, one for each passenger. At the ends of each carriage public bathrooms are provided, and, in addition to the usual needle bath, washstand, &c., specially fitted dental bowls are installed. There is accommodation for one servant per passenger. The parlour-lounge carriage can be readily converted into a dining-room, when necessary.

There are also special carriages for luggage not required on the voyage, and luggage which may be required. The latter is placed in a compartment which can be entered on application to the train

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conductor. A feature new to India is the supply of bedding, cushions, towels, hassocks, blankets, and other bedroom equipment, which may be obtained on application. Hitherto each passenger has had to carry his own valise and toilet requirements, and this new departure will be welcomed, for, apart from the nuisance of carrying portable beds, their presence in a crowded carriage severely constricts the already cramped accommodation.

The passenger portion of the G.I.P. train consists of five corridor vestibuled bogie carriages, one of which contains luggage compartments, accommodation for restaurant car servants, and an up-to-date kitchen and pantry. Another is a restaurant and smoking car, the restaurant portion being divided by a partition with a curtained doorway. There is ample accommodation for all the passengers on the train to take their meals at one sitting. Two single-berth compartments are also provided on this vehicle.

Two of the carriages are sleeping cars with passenger compartments, toilet compartments and bathroom, the fifth carriage containing accommodation for two passengers, for the train staff and stores, and passengers' servants. Altogether there is accommodation for 32 passengers. The carriages are upholstered in blue leather, and each window, besides the usual three window frames, is provided with a self-adjusting blue silk brocade blind. Externally, the train is painted olive grey with deep blue mouldings lined in gold, and the coats-of-arms of the G.I.P. Railway and the P. & O. Steam Navigation Company and the E.I. Railway appear on the body panels of each vehicle. The general scheme of interior decoration is carried out in white, buff and blue, and the whole creates a most artistic effect. On this train also, as on the East Indian train, bedding is provided by the railway company.

Electric lights and fans are liberally provided throughout each train. Great ingenuity and originality have been used in the devices controlling the lights and fans. In addition to electricians to attend to the electric system, the trains also carry two smart liveried attendants.

It is expected that when the Verbudda Bridge is reconstructed and normal running is resumed, the "Imperial Indian Mail" will do the Calcutta-Bombay journey in three hours less than the present transit time.

One of the primary points for decision by the railway authorities was whether an improvement in the quality of the service would be justified on financial grounds. On this point more than sufficient justification has been found for the provision of better rolling-stock, and the "Imperial Indian Mail" has therefore been built as an almost certain remunerative business proposition. There seems no doubt that as a business undertaking it is bound to pay its way, and thereby improve the revenues of the country.

It is believed that many business men in India to-day who could profitably make more frequent trips for business reasons refrain from doing so because of the discomfort entailed in the long journeys necessary in the country. In the new train passengers have a comfortable lounge, in a comparatively sound-proof carriage, easy chairs, card tables and a refreshment bar at hand, and the journey should be as comfortable as it is possible to make it.

Accommodation on the "Imperial Indian Mail" can be reserved at the London offices of the P. & O. Company, arrangements with which have been taken into account in deciding upon the introduction of the new trains.

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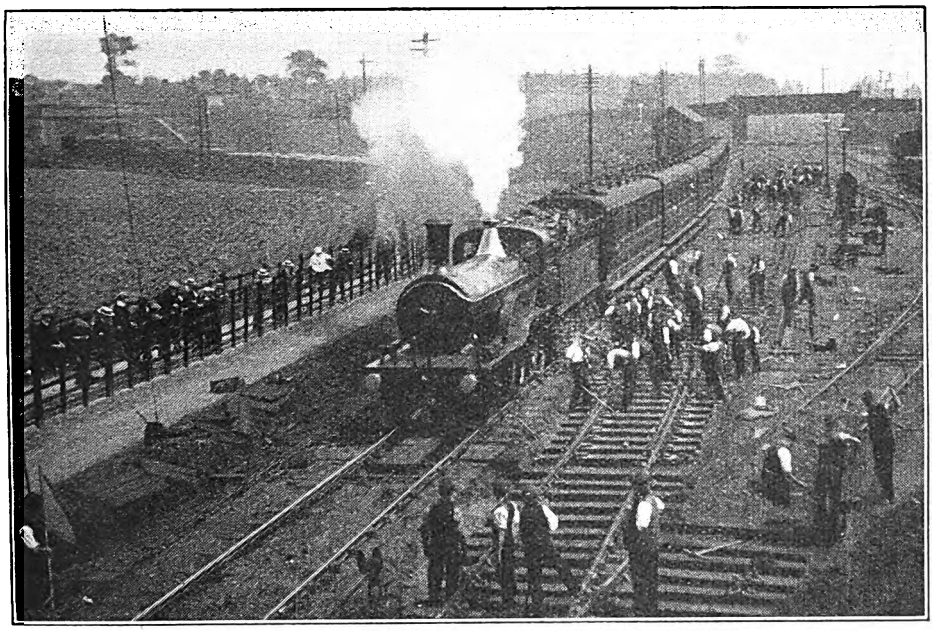

Photo.] [*F. H. Gillford.*

TEMPORARY SINGLE LINE WORKING DURING RELAYING.

This view, reproduced in our pages some years ago, is repeated as specially appropriate to this article.

Rail Laying and Relaying.

By R. S. SCHOLEFIELD, A.M.Inst.C.E.

II.—RELAYING.

THERE are several methods by which relaying of permanent way is carried out. One method is the gradual replacing of the old with new rails one by one, and the replacement of the old sleepers and chairs by new sleepers and chairs. This method has, however, been found to be more expensive than the other systems.

Another method is that of laying the new track alongside and entirely outside the old line.

This is a quick method of doing the work when the interval between trains is very short, and provided there is width enough on the cuttings and embankments free from obstruction for the new line to be laid temporarily parallel to the old track.

An alternative method is the interlacing of the old rails by new rails at a distance of say, one foot away, and then finally slewing the new line complete into position as fast as the old line can be removed. This method has been found to be a good one where the chairs are fastened on the sleepers upon the ground.

A third method, and most probably the best as regards a good running road in the future, is that of clearing away the old line entirely, preparing a new bed for the sleepers, and the laying of the new track in position without slewing.

Special permanent way trains are used for the conveyance of the sleepers, rails, fastenings, tools, &c., from the central depot. Some means of conveyance must also be provided for the relaying gang, and provision is required for cooking

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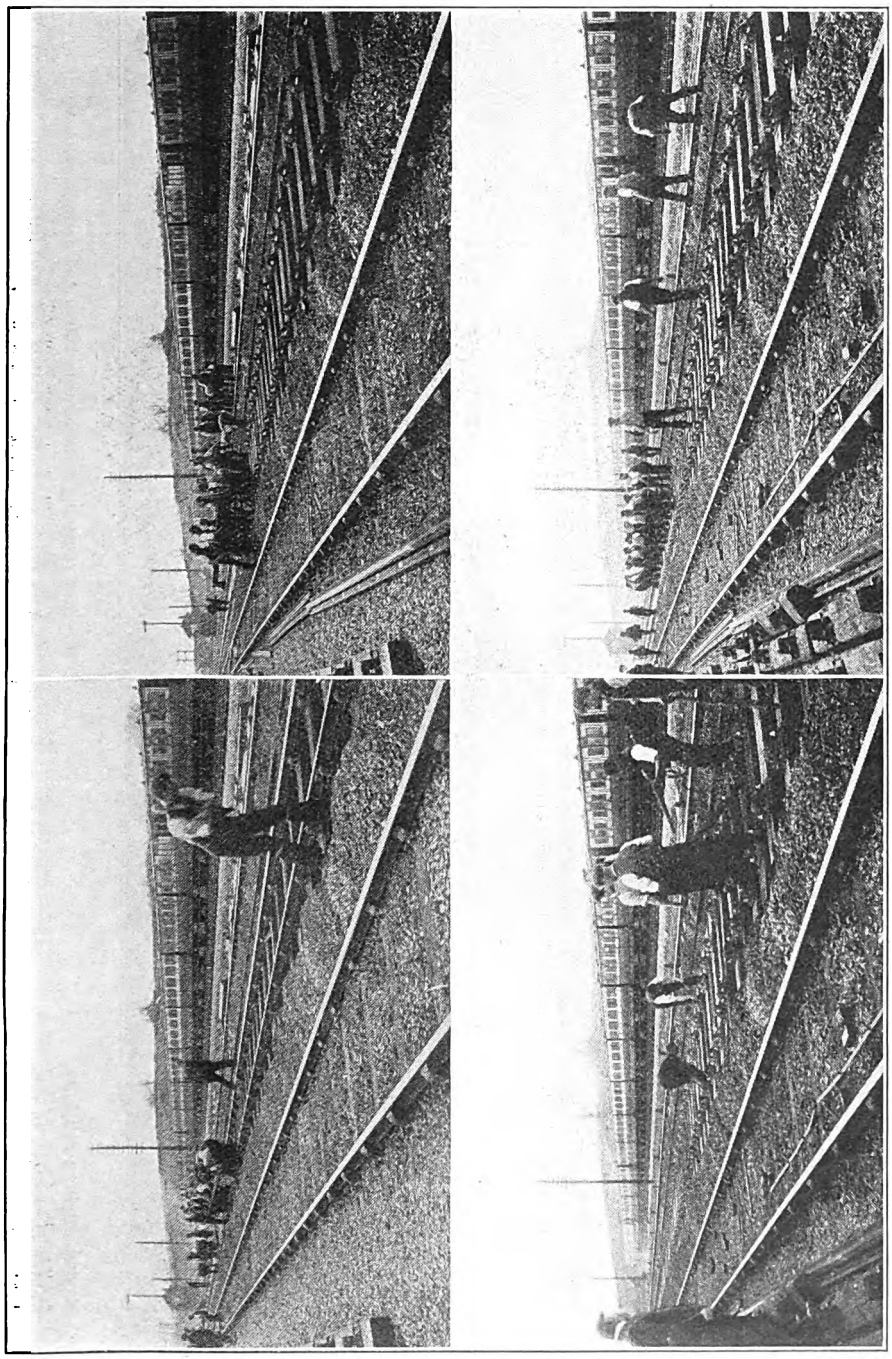

5.—Lifting out old rail.

6.—Replacing old sleepers by new ones.

7.—Gauging sleepers to six-foot. New rails can be seen beyond plate-layers.

8.—Lifting in new rail with grappling irons.

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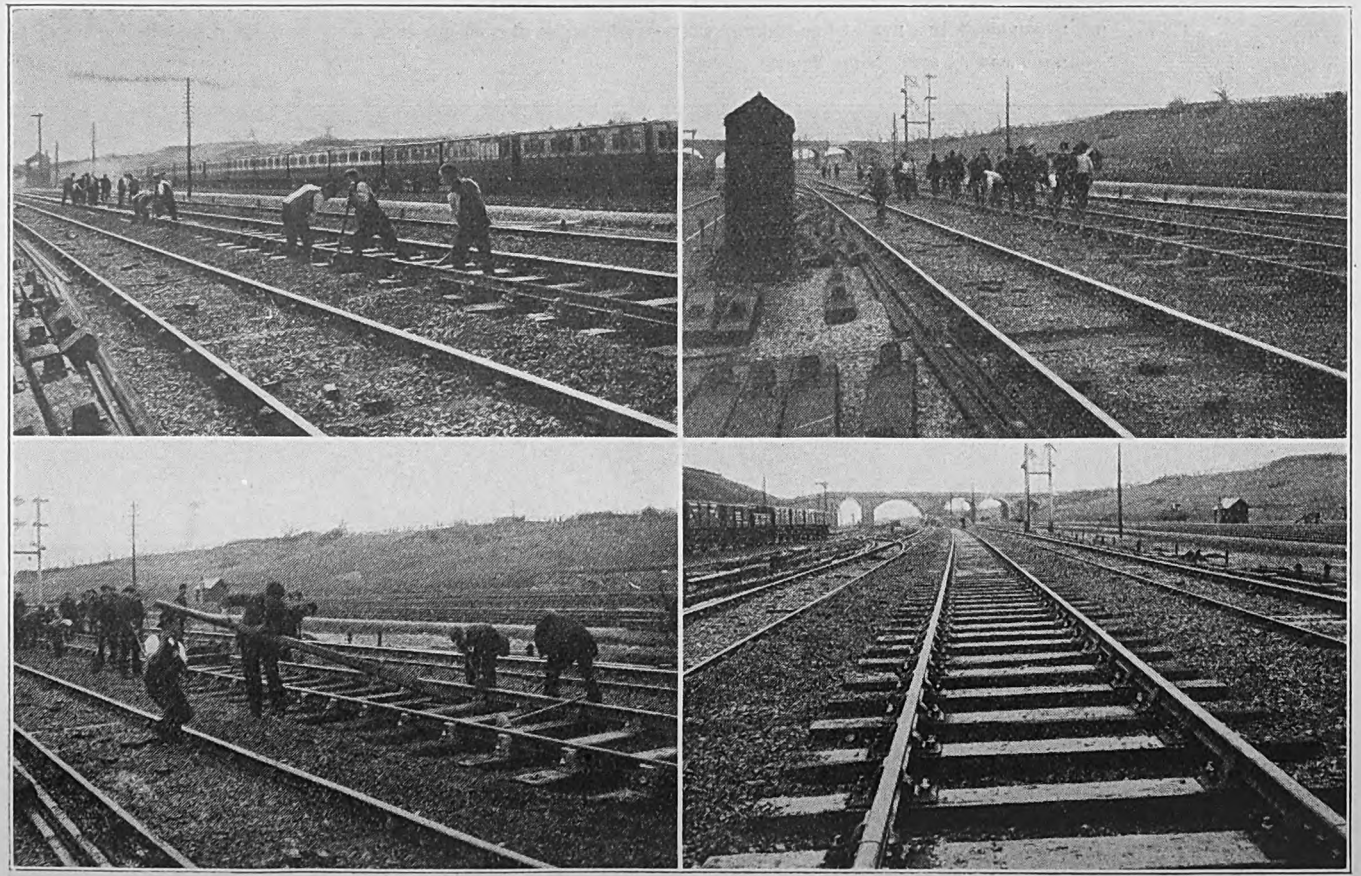

9.—Keying. Bolting fishplates.

10.—Men returning to commence lifting and packing rails, etc.

11.—Taking out hollows in rails.

12.—Line ready for traffic. Ballast put in at leisure.

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their meals. The sleepers will probably be ready chaired, the chairs being fixed to correct gauge at the creosoting depot or permanent way stores belonging to the railway. The new rails will be laid lengthways alongside the track, touching one another at the ends, and the sleepers will also be laid at the side of the line, the number, in proportion to the rails, being that required for the standard of the permanent way and length of rail whatever it may be.

For the protection of the wood, the sleepers will be lightly but efficiently sprinkled with sand or small or spent ballast, to prevent them catching fire from sparks given off by the engines of passing trains, a very real danger on all railways, and the cause of considerable loss.

The old ballast is loosened and taken out by pick and shovel, and is thrown into the 6-ft. way between the two lines of rails in the case of a double line, or at the side if the track is a single line. The question always arises whether the old ballast is "spent" or is capable of being re-used. If the former, it is either spread over the banks on each side of the track, or is immediately removed in ballast wagons. Cinder ballast is generally sifted by throwing it through a screen, or is riddled by hand, all below $\frac{1}{2}$-in. size being rejected and thrown out.

The trains can be passed over the line in this condition when the ballast is removed, but all trains should be slackened whilst travelling over. This points at once that all relaying and reballasting operations should be carried out as quickly as possible, since a few "slackenings," even if for this purpose alone, will cause much delay and discomfort to goods and passenger trains, especially if several slackenings at different places are encountered in one journey.

A straightening party of, say, half a dozen men will precede the relaying gang, the party being equipped with a powerful jim-crow and crowbars, for the purpose of taking all the bends and twists out of the new rails as they lie alongside the line. Of course, the rails are shop-straightened before they leave the rolling mills, but their subsequent stacking, handling, loading, carriage and unloading frequently gives them a permanent set, which must be taken out before they can be used in relaying.

The process of straightening the rails must be very carefully done, and is necessarily a slow one, hence the necessity for the special straightening gang to be working some distance ahead of the larger gang which carries out the actual relaying. Sometimes the straightened rails are distinguished from those not so dealt with by standing them on the lower flange instead of leaving them lying on their sides.

There are two general methods for gaining the time requisite for the relaying operations, one being called the "single-line" method, and the other the "slackening" system. By the first the whole of the trains are diverted either by special cross-overs or by cross-overs already in use on to an adjoining line, and in this case, although special signalling arrangements will be necessary, the trains need not in all cases be slackened or held up, although slackening is generally desirable. By the second method the line being relayed is marked by special lamps and signals for the information of the drivers of trains, and in all cases during the operations, when once begun, the trains must travel over it at a reduced speed. The absolute block intervals, when the rails are out of the line, or are unsafe for trains to travel over, should be so arranged, if possible, that no important train is brought to a stand, and other trains are impeded to as small an extent as possible.

In the first case the adjoining line has to do double duty, and much inconvenience may be caused through this single-line working, and in the second case there is always an element of some degree of "unsafety" until the work is finished. Each case will probably be dealt with according to its own merits, and no hard and fast rule can be laid down. If the intervals between trains are too short to admit of the required rate of progress, single-line working is imperative; and if the trains are too numerous day and night during the week, Sunday relaying must be resorted to, when there are no, or only a few, trains running. In the latter case the progress of work is practically limited only by the size of the platelayers' gang that is available, and the supply of materials.

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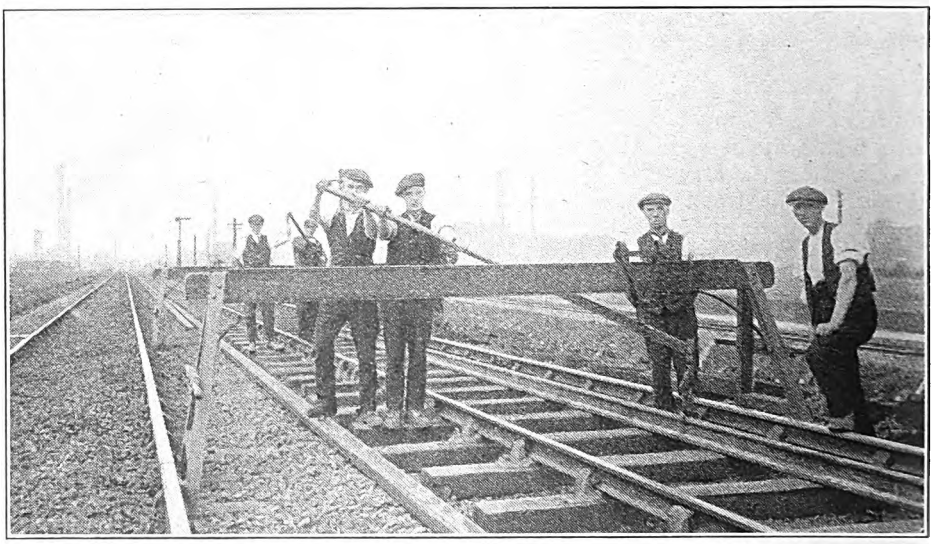
If the work is done under the "slackening" system, a very careful estimate must be made of the time available between trains. This will determine what lengths can be dealt with at one time. The old fish plate bolts will be partly unscrewed, and alternate keys will be taken out, leaving all those nearest the rail joints to be removed at the very last moment.

Immediately the last train has passed over, of course, at the slackened speed, since many of the keys and fish-plate bolts will be out of the track, the remaining keys are knocked out and the fish-plates removed, probably by knocking off the heads of the bolts with a sledge hammer. The rail lifters then range themselves alongside the rail at about 2-ft. distances, lift the rails from the chairs, and either lift them into the 6-ft. way or carry them clear away from the track. The sleepers are lifted away each by three men, the first two by a bar under the front of the sleeper, and the third at the rear, and of course are thrown clear away from the road.

Other men in the relaying gang will now straighten the top of the ballast, whilst the sleeper men will return with a new-chaired sleeper, which they will handle in the same way that they lifted the old chaired sleeper away from the line. The new rails are then brought to the work by men spaced as before at about 2-ft. distances and laid down on the top of the chairs. By a half-turn the rail is placed in its seating and pressed home against the groove formed by the inner lip of the chair.

It is necessary to provide for the expansion of the rails in the hotter part of the day, and for this purpose expansion irons, wedges, or gauges are temporarily placed between the ends of the rails at each joint. These gauges are of varying thickness according to the temperature when the rails are laid in the chairs, a $\frac{1}{4}$-in. thickness of gauge being perhaps used in the early morning and in cold weather when the rails are in a condition of contraction. About $\frac{1}{3}$ in. is allowed in the case of 60 ft. rails, when the temperature is 60° F. The expansion gauges are removed when the rails are keyed next to the joints.



RAIL LIFTER IN SERVICE

Directly the gauges are placed between the ends of the rails at the joints, the fish-plates are put on and secured by two out of the four bolts fastening each plate. The keys are driven in the chairs at the two ends of the rail, and one or two nearer the centre, and the rails are then marked with chalk to show the exact place of the intermediate cross sleepers.

Whilst these fish-plates and keys are

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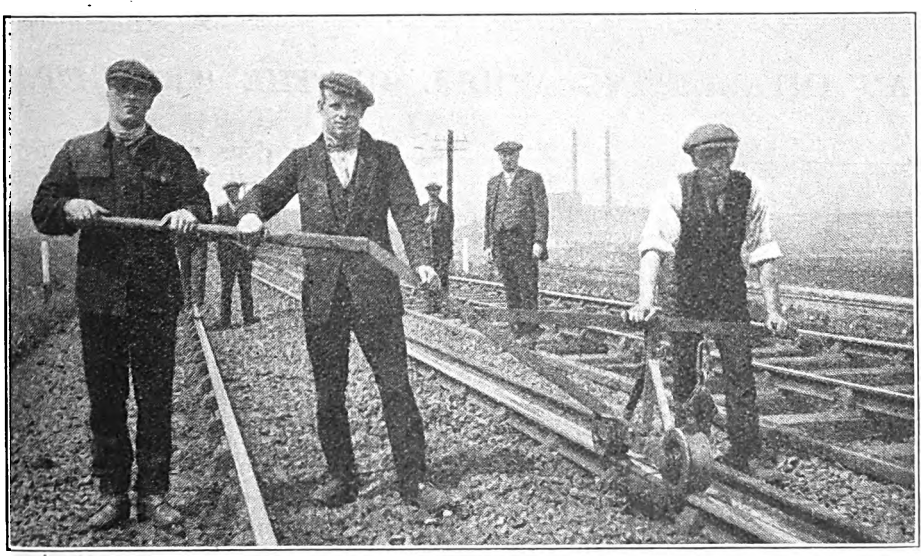
being fixed, the rail men are taking out and replacing the next ahead lengths of rails and sleepers, and at the same time another gang is following, or a preceding gang may return, to bolt up the remaining holes in the fish-plate connections, and to drive in the remaining wooden keys that have been omitted.

When, as is frequently the case, at the beginning and ending of the section being relayed, the new rails are different in section from the old worn rails, special cramped fish-plates are necessary, the bolt holes being perhaps slotted to make as good a connection as possible between the old and new rails.

a greater lift than this the raising of the road must be done in at least two successive lifts, all the cross sleepers being thoroughly packed after each lift.

The final ballasting of the road should not be done until some weeks after the relaying has been completed, in order that the permanent level of the road may be determined and maintained for a time. The ballast is then brought up in wagons, shovelled out to the side of the line, the wagons are taken away, and the ballast is then shovelled under and between the sleepers. It is not advisable to cover up the keys of the chairs with ballast even though this covering keeps the rain and



RAIL SCOOTER.

The ordinary maintenance gang of the length undergoing relaying will probably now follow on to bring the road up to a correct level before trains are once more allowed to travel over it. If trains work over before the final adjustments are made, the danger is that a permanent set may be given to the rails whilst the bed is more or less uneven, whereas by early attention this may be prevented.

The ganger lies or bends down and looks along the length of line whilst the other men in his gang pack up and lift the rails.

It is an understood rule, even when gradients are adjusted, that no one lift given to a sleeper shall be greater than 3 in., and if any part of the track requires

the sun from direct action upon them. Such covering of the keys will prevent efficient inspection and will do more harm than good.

In the case of relaying done during "slackening" the time taken will obviously depend upon the number and times of the trains, or the amount of interruption from passing traffic. It has been found possible to take out and relay seven lengths of 30-ft. rails, or 70 yards, in 23 minutes, the road then being ready for trains running at reduced speed. A gang of 105 men has been known to relay a length of over a mile in one Sunday.

These times include all the work done to the track, including both the removal

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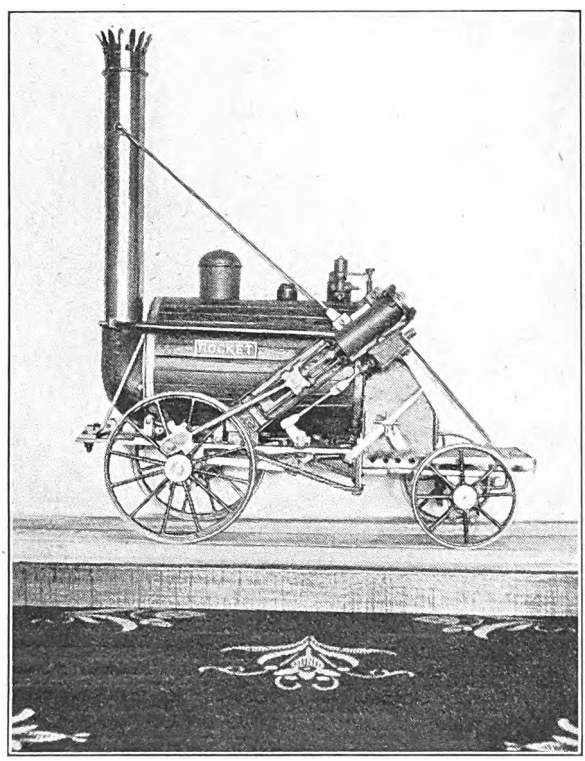
of the ballast, the relaying, and the final keying up, fishing, and the straightening and levelling of the road necessary before trains can safely pass over it at reduced speed. There is much room for individuality of treatment in the case of permanent way relaying. Some gangers will use all the comparatively short intervals between trains, say, even of 15 or 20 minutes, to take out a few rails, perhaps 6 lengths, and replace them with new material; whilst other gangers will prefer to make use of the longer intervals only between trains, say, of at least one hour, and take out and relay 20 or 30 lengths during this longer time.

In the first case the men are kept more constantly employed than in the second case because every interval is taken advantage of for the work; and in the second case it will be necessary to employ the men, apart from the longer intervals, in unballasting and opening out the road in front, and in ballasting up and levelling up the road at the rear. This, of course, involves much more walking of the men backwards and forwards. When long sections are laid at one spell there is a saving in the closing up to the old rails since the closures will be fewer in number.

(To be continued.)

AN INTERESTING MODEL OF THE "ROCKET."



The photograph reproduced has been sent by Mr. H. Wheelwright, now of Oakleigh, Victoria, Australia, but formerly resident near Halifax. The point of interest is that it was made on the basis merely of one of the ordinary sketch illustrations of the *Rocket* which figure in various publications and aided by memory. The model is all scraps, barring the boiler and funnel. The driving wheels are in 16 pieces and made from galvanised hoop iron, the frame from $\frac{1}{8}$th hoop iron; connecting rods, slides, &c., wire nails; the cylinder brass pipe, with iron flanges; and there is not a casting in the whole model. The furnace tube is 2 in. diam., and contains 8 Galloway tubes made from brass cartridge cases. The lamp has three burners and is fastened underneath, the short pieces of tube passing from the outer shell to the inside of the furnace tube, allowing the burners to pass through (the lamp is not shown in the photograph), and these form an internally fired boiler. Mr. Wheelwright also mentions a strange incident which occurred during the work. He had no copper wire for rivets and playfully said to his son, who was digging up weeds in the garden, "I wish you would dig up a piece of copper wire about 2 ft. long and $\frac{1}{16}$-in. diam." Five minutes later he came into the house and said "Will this do?" producing a piece of wire a little over 2 ft. in length and of the required diameter. Moreover, it was of copper and the rivets in the boiler were made from it. It is thought that the wire had been buried by a former tenant.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

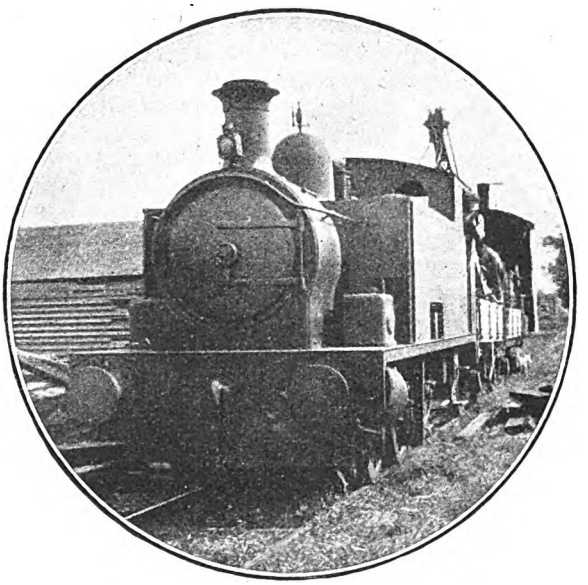

Photo.] [*K. Bindoff.*

CONTRACTORS' 0-6-0 TANK ENGINE WORKING AT RICHBOROUGH.

FROM a reader of long standing—Mr. C. A. Hunt—I have received a letter of no small interest, which I now propose to make public. It is by way of comment on the present tendency of enlarging cylinder dimensions, and, in particular, of lengthening piston-stroke. "Certain passenger locomotives of the 4-6-0 type, designed by Mr. Urie," he writes, "as also Mr. Maunsell's 2-6-4 express tanks, embody alike one unusual feature in British locomotive design, namely, six-coupled wheels of a diameter of 6 ft., allied with cylinders having a stroke of 28 in. There would be nothing unusual about this if, on the one hand, the roads over which these engines work incorporated gradients like those encountered on the Highland main line, or the Great Western Railway west of Newton Abbot, or, on the other hand, if they were employed on miscellaneous duties, usually assigned to locomotives of the 'mixed traffic' type. But they are found working on express trains, turn-and-turn-about with engines having larger wheel diameters conforming more nearly to the usual 'express' standards, on the moderate gradients between Salisbury and Waterloo, Bournemouth and Waterloo, and also on the Central Division of the Southern Railway.

"It is true, of course, that there can be found on the Great Western Railway express locomotives with the still longer stroke of 30 in.; but the wheels to which they are connected have a diameter of 80 in., so that the ratio of cylinder stroke to wheel diameter is somewhat less than in the Southern Railway engines, while the larger wheels do not require so many revolutions to cover the same distance. But even on the Great Western, no express engines provided with these abnormally long cylinders (for this country) have been built for some years. Although at first sight the difference between wheel diameters of 6 ft. and 6½ ft., the more usual one for express work, may appear trifling, it may be observed that the smaller wheel has, in fact, to make something like 22 additional revolutions to the mile; and although you have recorded speeds up to 75 miles an hour behind one of the 2-6-4 tanks on an Eastbourne express, the greater speed of the revolving and reciprocating parts must tend to wear out the engine in a shorter time than what is in this country regarded as the normal life of a locomotive. Moreover, the increase in the stroke of the outside cylinders necessarily increases the travel of the connecting and outside coupling rods, and the additional strains imposed on these render it necessary to make them heavier

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and more massive, this tending in its turn to increase the vibration of the engine when running at speed, with consequent increased wear of tyres and rails.

"The most notable instance in this country of the association of long cylinder stroke with small wheels in passenger locomotives is to be found in the Great Western Railway 2-6-0 mixed traffic engines, namely, 30 in. with 68-in. wheels; but so far as concerns passenger work, they are reserved for duty either on the mountainous grades of Devon and Cornwall, or else on stopping trains elsewhere, only appearing exceptionally or in an emergency on express trains on the easier grades. You have recently recorded some astonishingly high speeds behind these engines for short distances, but judging by the rattling and clanking which some of them emit when at work, they do not thrive on high speed, and it seems inevitable that an unduly large proportion of the effort which they produce when running at speed is absorbed in internal resistance. If their cylinders were of the same dimensions as those of the equally useful type designed by Mr. Gresley for the Great Northern Railway, namely, 20 in. by 26 in., one wonders if they might not work quite as efficiently as at present, while, at the same time possibly enjoying a longer life of usefulness.

"It also appears that Mr. Maunsell is not a believer in cylinders of large volume, which have generally been resorted to by his contemporaries since the introduction of superheating. Thus the 'King Arthur' class of express locomotives reproduce most of the leading dimensions of Mr. Urie's last batch of 4-6-0 engines, except the cylinders. The unusually large dimensions of the latter in the Urie engines (22 in. by 28 in.) produce a combined volume of about 12¼ cub. ft., but in spite of this fact, you have recorded in these pages that, during prolonged observation, they never ran short of steam. Nevertheless, the cylinder diameters of the 'King Arthur' class were cut down to 20½ in., thus sacrificing at a stroke rather more than 1½ cub. ft. of volume. Moreover, when rebuilding the penultimate type of Wainwright 4-4-0 express engines for the Eastern Section with larger fireboxes and superheating equipment, contrary to the usual practice the cylinders were not enlarged at all. And when designing the latest type of 4-4-0 locomotives for the same section, Mr. Maunsell provided them with 19½-in. cylinders, instead of the 20½-in. ones previously

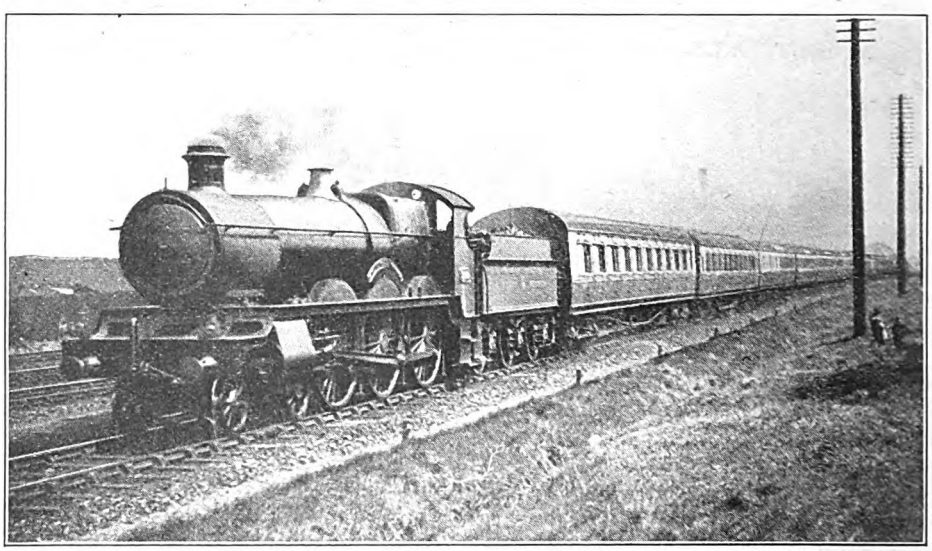

Photo.] [*W. Leslie Good.*

DOWN BRISTOL AND SOUTH WALES EXPRESS NEAR WEST DRAYTON, G.W.R.

Two-Cylinder 4-6-0 No. 2949 *Stanford Court.*

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introduced by Mr. Wainwright, another sacrifice of about one cubic foot of volume.

"But it is the unexpected which always happens, for Mr. Maunsell has provided his latest engine, the *Lord Nelson*, with four cylinders, whose combined volume exceeds that of Mr. Urie's engines last-mentioned above, as well as that of any locomotive on the Great Western Railway, is equal to that of the largest on the London, Midland & Scottish, and is only inferior to that of the three cylinders of Mr. Gresley's 'Pacifics'; moreover, the stroke of the four cylinders is the more usual one of 26 in.

can only be adequately tested by experience extending over a considerable period of time, due regard being at the same time given to the cost of repairs and the consumption of fuel and lubricants."

It is difficult to know exactly what comment to offer on this thought-provoking letter. The writer says in his final paragraph: "It is always unsafe to dogmatise about the locomotive engine, and those who are familiar with the history of locomotive development will surely agree that, over and over again, the performance of certain locomotive types have confounded the theorists." How else could

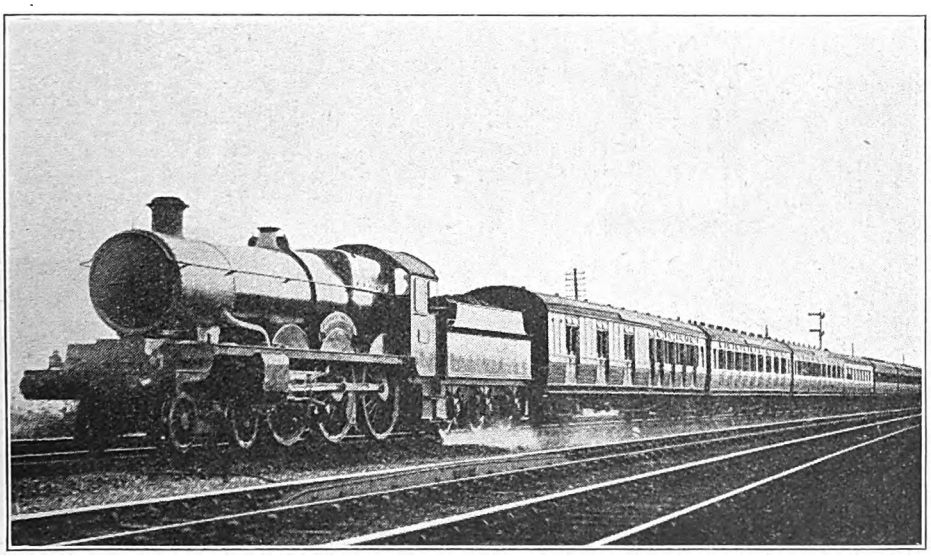

Photo.] UP-PLYMOUTH EXPRESS, G.W.R. [*M. W. Earley.*

"Castle" Class 4-6-0 No. 4094 *Dynevor Castle.*

"It is always unsafe to dogmatise about the locomotive engine, and those who are familiar with the history of locomotive development will surely agree that, over and over again, the performances of certain locomotive types have confounded the theorists. Some engines have achieved, constantly and consistently, far greater feats of speed and haulage than their dimensions warranted, while others have fallen short of the standards which their design ought to have enabled them to maintain. The moral is that the success or otherwise of the above-mentioned departures from the usual practice, which are to be found in Mr. Maunsell's engines, one account, by way of example, for that perfectly amazing effort of Great Northern "Atlantic" No. 4452 between Doncaster and King's Cross, described in my 200th article in February last? Here is an engine with cylinders but 20 in. in diameter by 24 in. stroke—not even so much as 26 in.—and yet time is kept on a fast booking with a load, for part of the distance, no less than 490 tons behind the tender. One of the feats, in particular, on which length of stroke has an intimate bearing, was the attainment of 38 m.p.h., with this train, up 5½ miles continuously at 1 in 200, from a dead start. A similar example will be found later in the present article, where a

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2-cylinder G.W.R. 4-6-0 is found hauling a 485-ton train up a 1 in 300 gradient at a sustained speed of 55½ m.p.h.; in this case, however, the engine at least had the advantage of a 30-in. piston stroke.

In the early days of my responsibility for these articles, I was wont to reason, from the purely dimensional point of view, as to what should be the relative capabilities of different locomotive types; but as the years have passed, I have come to realise that this is so illusory a basis of reckoning as long since to call for the abandonment of the method. Locomotive performance is compounded of so vast a possible—with, of course, reduction in coal consumption—without impairing the steaming capacity of the boiler. Yet again, the engine of the L.M.S. "Claughton" type fitted with the Italian "Caprotti" valve-gear, although found capable of working maximum main-line duties on the Western Division most successfully at no more than 12 per cent. cut-off with full regulator, has not succeeded in bettering, or even equalling the low figure of coal consumed per indicated horse-power-hour reached by *Launceston Castle* in the recent exchange trials, thus showing that differences in boiler and front-end design

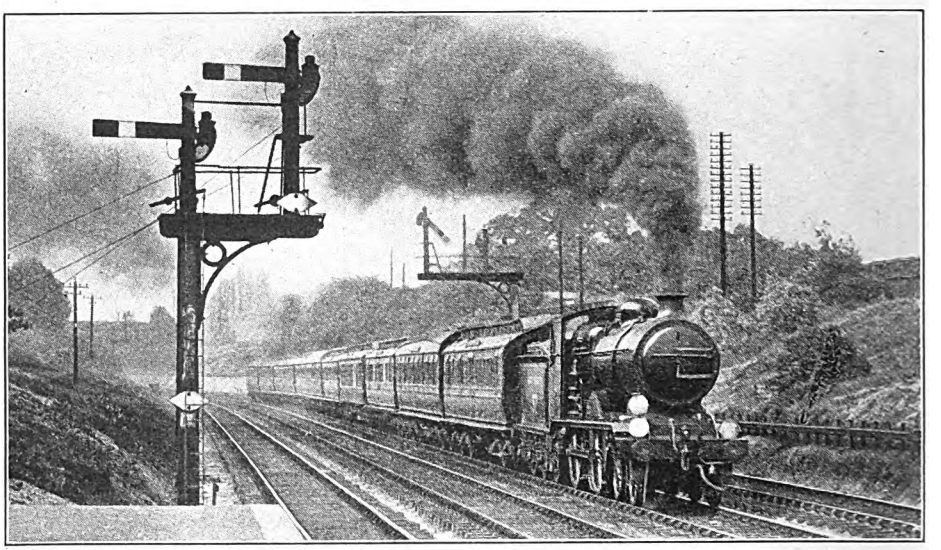

Photo.] [*O. J. Morris.*

5.5 P.M. LONDON BRIDGE AND EASTBOURNE EXPRESS PASSING HONOR OAK PARK, CENTRAL SECTION, S.R.

Class "B4x" 4-4-0 No. 52B, and train partially composed of old Royal Stock.

diversity of factors that no one, nor two, nor even a considerably larger number of them in combination will, on the basis of merely statistical calculation, foreshadow with any accuracy the ultimate capability of the locomotive type concerned. To a large extent the method of experiment, and, if necessary, of initial error, must be followed in arriving at a successful result. Here again my correspondent reminds me that three successive enlargements have been made of *Lord Nelson's* blast-pipe, the draught, even with these large cylinder dimensions, being so fierce that considerable softening has been found generally may more than counterbalance higher efficiencies in the cylinders alone.

My only other comment on the letter is that the Great Western "Moguls" can hardly be judged alone on their suitability—or the reverse—for express passenger work. The occasions on which really fast travelling is required of them must form a very small minority of their duties, and as regards the general run of the work allotted to them, there is little doubt that the increased leverage of their 30-in. stroke must prove of no small value. Further, if a 30-in. stroke is really objectionable in regard to the

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development of speed, how is it that the 2-cylinder 4-6-0 engines of the Great Western have the reputation of being the fastest machines on that railway? And, again, so far as concerns small wheels, what about the extraordinary feats put up daily by the 6 ft. 1 in. "Pacifics" of the French Nord?

This reminds me of a letter which I have just received from another long-standing reader—Mr. J. P. Pearson—in which, after kindly offering congratulations on the passing of my second "century," he mentions a recent run out of Paris, with one of the latest 4-6-2 engines just mentioned, which embodied one very remarkable achievement. No. 3.1224 was the locomotive, and the gross load behind the tender was 460 tons. "Downhill and on the level, as also up to Gannes," I read, "no specially notable work was exhibited. But we never fell below 60 m.p.h. up to Survilliers, and passed that station in 20 min. 5 sec., which is better by 65 sec. than the time you record with 55 tons more. Dannes-Camiers up to Neufchâtel took 3 min. 50 sec., the slowest kilometre being run at all but 54 m.p.h. But the ascent of Caffiers was the best. With almost a dead stop before Wimille we were hampered for the climb, but nevertheless did Marquise to Caffiers in 6 min. 13 sec., the two slowest kilometres taking 48 sec. apiece, which is equivalent to 47 an hour! Your figure from Marquise to Caffiers, with 515 tons, was 7 min. 10 sec. My train was the 10 a.m. out of Paris on October 29 last, and I may add that the driver did not know I was on board."

From yet another well-known railway publicist—Mr. F. W. Brewer—there comes a letter adverting to a matter of history referred to in my 200th article. "Your statement," he writes, "that the late Mr. Chas. Rous-Marten kept locked within his breast throughout his lifetime the fact that *City of Truro* reached a maximum speed of 102 m.p.h. in 1904 is not, of course, quite accurate, as the speed was disclosed by him in a letter to Mr. Inglis of June 20, 1905. I cannot understand why the publication of this letter in 1922 should have been regarded as the first public or general announcement of this feat by the engine in question, seeing that in THE RAILWAY MAGAZINE for April, 1908 (page 268), Mr. Rous-Marten distinctly mentions it, in these terms: 'the maximum of the coupled engine was

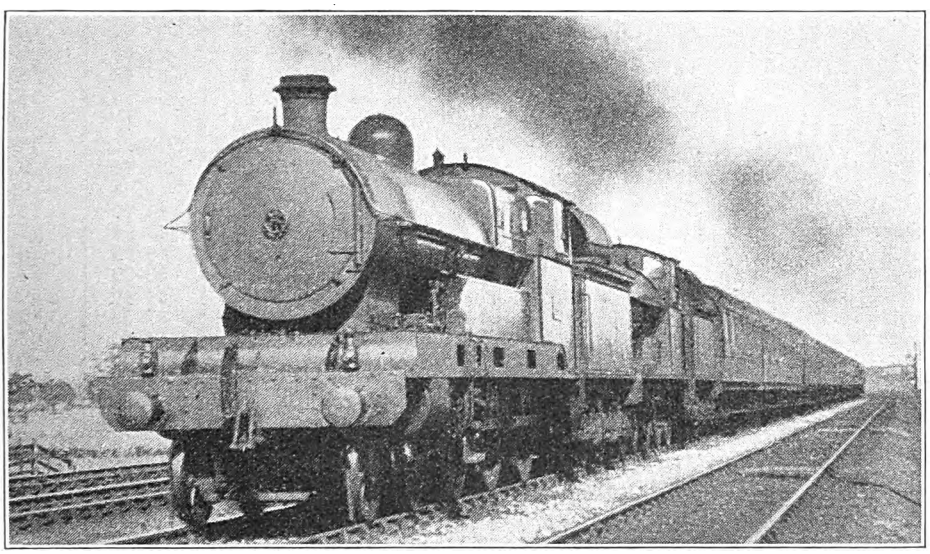

Photo.] [*W. Leslie Good.*

DOWN LIVERPOOL EXPRESS NEAR TAMWORTH, L.M.S.R.

L.N.W. locomotives (both oil-fired) Nos. 1335 and 2198 *John Ruskin*.

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G.W.R. PADDINGTON—

Train.		3.55 P.M.				
Engine : 2-cyl.4-6-0 No.			2916	2943	2942	2986
,, Name :			*Saint Benedict.*	*Hampton Court.*	*Fawley Court.*	*Robin Hood.*
Load/tons, tare/full (*a*) ..	Distance.	Schedule.	290/310	290/310	323/340	333/360
,, ,, (*b*) ..			290/310	290/310	323/340	333/360
	miles.	min.	m. s.	m. s.	m. s.	m. s.
Paddington	0·0	0	0 00	0 00	0 00	0 00
Westbourne Park	1·3	—	3 00	3 00	3 00	3 05
Ealing Broadway	5·7	—	8 35 p.w.s.	8 25	8 35 p.w.s.	9 00
Southall	9·1	11	14 05	11 35	12 30	12 25
West Drayton	13·2	—	18 30	15 15	17 05	16 20
Slough	18·5	20	23 05	19 35	21 45	20 45
Maidenhead	24·2	25½	28 20	24 30	27 15	25 45
Twyford	31·0	31½	34 30	30 35	33 55	31 45
Reading	36·0	pass	pass	sigs. pass	pass	sigs. pass
	36·0	37	39 00	35 20	38 45	40 20
Tilehurst	38·6	—	41 25	38 05	41 10	sigs. 44 25
Pangbourne	41·5	—	44 00	41 00	43 55	47 35
Goring	44·7	—	47 05	44 05	46 55	50 45
Cholsey	48·5	—	50 35	47 35	50 20	54 25
Didcot	53·1	53	55 00	51 50	54 40	59 00
Steventon	56·5	56½	58 05	55 05	57 55	62 15
Wantage Road	60·4	—	61 45	59 00	61 30	66 00
Challow	63·9	—	65 00 sigs.	62 25	64 50	69 15
Uffington	66·5	—	70 15	65 00	67 20	71 40
Shrivenham	71·6	—	75 00 p.w.s.	69 55	72 10 p.w.s.	76 10
Swindon	77·3	77	83 35	75 35	80 35	81 20 sigs.
Wootton Bassett*	82·9	83	89 00	81 05	86 25	88 20
Brinkworth	87·0	—	93 05	85 15	90 20	92 35
Little Somerford ..	89·7	—	pass	pass	pass	pass
	89·7	—	95 25	87 40	92 45	94 55
Hullavington	94·2	—	99 35	92 10	97 05	99 20
Badminton	100·0	(*c*)	106 10	99 20	pass	106 55
	100·0	103	106 50	100 20	103 30	108 00
Sodbury	104·6	—	112 45	106 35	108 00	114 40
Winterbourne	109·9	—	117 05	111 25	112 50	119 30
Stoke Gifford* East Box	111·5	pass	pass	pass	pass	pass
	111·5	114	118 30	112 55	114 20	121 05
Patchway*	113·1	116	120 15	114 45	116 05 sigs.	122 55
Pilning	116·7	—	123 50	118 20	121 20	126 45
Severn Tunnel East End* ..	118·1	—	125 05	sig. stop	122 55	128 10
,, ,, West End ..	122·5	127	130 30	127 10	127 55	133 25 sigs.
,, ,, Junc.* ..	123·6	128½	132 40	129 15	130 00	136 00

(*Continued on page* 296.)

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NEWPORT (MON).

8.55 a.m.					7.55 p.m.			
Schedule.	2908 *Lady of Quality.* 270/285 211/225	2908 *Lady of Quality.* 361/380 300/315	2954 *Tockenham Court.* 415/435 354/370	2940 *Dorney Court.* 439/465 346/365	Schedule.	2936 *Cefntilla Court.* 321/345 263/285	2936 *Cefntilla Court.* 424/450 366/390	2942 *Fawley Court.* 459/485 335/355
min.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	m. s.	m. s.
0	0 00	0 00	0 00	0 00	0	0 00	0 00	0 00
—	2 45	3 20	3 15	3 35	—	3 00	3 15	3 40
	p.w.s.							
—	9 25	9 10	9 40	10 20	—	8 15	9 45	10 05
		p.w.s.	p.w.s.				p.w.s.	
12	12 50	14 55	15 25	14 15	12	11 45	15 50	13 45
—	16 50	19 25	20 30	18 30	—	15 45	20 50	18 05
21	21 40	24 25	25 50	23 25	21	20 35	26 00	23 10
27	27 05	30 05	31 30	29 00	27	26 20	31 30	28 40
34	33 35	36 30	38 05	35 45	34	32 10	38 10	35 15
	sig. stop					sigs.		
40	44 30	42 20	43 35	41 15	40	38 30	43 35	40 50
0	0 00	0 00	0 00	0 00	0	0 00	0 00	0 00
—	4 35	4 45	5 15	5 10	—	5 25	5 10	5 05
—	7 45	7 55	8 35	8 35	—	8 35	8 35	8 10
—	10 50	11 10	11 55	12 05	—	11 45	12 00	11 15
—	14 15	15 00	15 30	15 45	—	15 30	15 40	14 40
19	18 30	19 45	20 00	20 30	18	20 10	20 15	19 05
22½	21 35	23 10	23 30	24 05	21½	23 25	23 35	22 20
—	25 10	27 00	27 30	28 10	—	27 25	27 30	26 10
—	28 35	30 35	31 10	31 50	—	30 45	30 50	29 35
—	30 55	33 10	33 50	34 35	—	33 05	33 20	32 05
			p.w.s.					
—	35 35	38 15	39 50	40 00	—	37 50	38 25	37 00
		sigs.	p.w.s.				p.w.s.	p.w.s.
43½	41 05	44 40	49 35	46 10	42	43 05	45 15	44 15
49½	46 15	51 00	56 00	52 05	48	48 15	51 35	50 10
—	50 30	55 20	60 20	56 25	—	51 55	56 25	54 10
						sigs.		
—	pass	pass	pass	pass	—	56 05	pass	pass
—	52 55	57 40	62 45	59 05	—	57 30	59 10	56 40
—	57 25	62 00	67 30	64 05	—	64 20	64 00	61 30
pass	pass	pass	pass	pass	pass	pass	pass	pass
67½	64 10	68 20	74 15	71 40	66	70 40	70 40	67 45
						p.w.s.		
—	69 10	72 20	78 35	77 25	—	76 50	75 20	71 55
							p.w.s.	
—	74 05	76 35	83 20	82 50	—	82 25	82 35	76 25
								sigs.
slip	slip	slip	slip	slip	slip	84 25	slip	79 20
78	75 35	78 00	84 55	84 35	77	85 45	84 35	81 40
80	77 20	79 40	86 55	86 45	79	89 15	86 15	86 00
—	80 55	83 05	90 15	90 30	—	92 50	89 30	90 10
							sigs.	
—	82 30	84 35	91 30	91 45	—	94 05	91 20	91 35
	p.w.s.							
91	88 25	89 25	96 20	96 35	90	99 05	96 15	96 35
93	90 45	91 15	98 20	98 35	92	101 00	98 50	99 10

(*Continued on page* 297.)

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G.W.R. PADDINGTON—

Train.			3.55 P.M.			
Engine : 2-cyl. 4-6-0 No.			2916	2943	2942	2986
,, Name :			*Saint Benedict.*	*Hampton Court.*	*Fawley Court.*	*Robin Hood.*
Load/tons, tare/full (*a*) ..	Distance.	Schedule.	290/310	290/310	323/340	333/360
,, ,, (*b*) ..			290/310	290/310	323/340	333/360
	miles.	min.	m. s. sigs.	m. s.	m. s.	m. s. sig. stop
Magor	126·0	—	135 50	132 25	133 05	141 10
Llanwern	129·6	—	141 40 sigs.	136 20 sigs.	136 50 sigs.	144 55 sigs.
Newport	133·4	140	147 45	142 15	144 30	150 15
Lateness of Arrival ..	(min.)	—	7¾	2¼	4½	10¼
Net times (*d*) minutes ..	36·0	} 140	†	†		† {
,, (*e*) minutes ..	97·4		133	134	136	135½ {

* Service Slacks. † Calculated on non-stop basis.

(*c*) Conditional Stop. (*d*) Paddington

more than 10 miles an hour faster, the unprecedented rate of 102·3 miles an hour being attained over a single quarter-mile, and exactly 100 miles an hour for half-a-mile.' The popular impression that the 1922 disclosure was the letting free of a great secret is therefore wrong." I am, I think, aware of this fact, seeing that I myself published the complete log of the journey in question in one of these articles some time before the Great Western authorities "revealed" the secret to the public. The whole point of my argument, to which Mr. Brewer refers, was that what in earlier days was *officially* kept in the utmost darkness possible, in later years is *officially* paraded as a creditable feat, witnessing thereby to the total change in railway publicity methods, concerning which I was writing. When I said that Mr. Rous-Marten had "kept locked within his breast" the "secret" of this run, it was merely the "official" secrecy to which I referred, as it is, of course, a well-known fact that the secret was "out" years before, by the various oblique references which Mr. Rous-Marten had made to it.

And now for performance. I have been so taken to task by correspondents for my references in February to the Great Western South Wales services that I feel the only way of clearing myself is to publish details of the runs to which I then referred. "I consider you to be guilty of gross inaccuracy, not to say misrepresentation," says one bellicose writer, "in your references to the South Wales services. You say that they are more than illustrated by the Bristol two-hour performances, which are achieved at higher speeds. On the contrary, the best South Wales trains are timed exactly as fast as the best Bristol trains in the down direction"—to be precise, one of the former (the 3.55 p.m. down) is alone so timed—"and their loading is, on the average, substantially heavier. Indeed, I cannot see how you can possibly reconcile with this statement your subsequent remark that some of your South Wales runs demonstrate how even a Great Western 4-6-0 can be overloaded."

In writing as I did, it is possible that I, too, desired to "draw a veil" over a fact which, if these logs were published, could not well be concealed. It is that not once since the war have I known one of these South Wales trains, in the down direction, to reach Newport on time. It will be seen in the large table of runs on the 8.55 a.m. and 3.55 and 7.55 p.m.

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NEWPORT (MON).—*Continued from pages 294 and 295.*

8.55 a.m.					7.55 p.m.			
Schedule.	2908 *Lady of Quality.* 270/285 211/225	2908 *Lady of Quality.* 361/380 300/315	2954 *Tockenham Court.* 415/435 354/370	2940 *Dorney Court.* 439/465 346/365	Schedule.	2936 *Cefntilla Court.* 321/345 263/285	2936 *Cefntilla Court.* 424/450 366/390	2942 *Fawley Court.* 459/485 335/355
min.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	m. s.	m. s.
—	93 50	94 10 p.w.s.	101 25	101 50	—	104 00	102 20	102 20
—	97 25 sigs.	99 50 sigs.	105 00 sigs.	105 45 sigs.	—	107 35 sigs.	106 20 sigs.	106 10 sigs.
105	104 40	106 20	111 45	115 05	104	115 00	115 00	114 00
—	3	5	10½	13¼	—	11¾	18	15
40	37½	39½	40	41½	40	37¾	40½	40¾
105	101½	101¼	105½	111	104	99½	106¾	102¾

(*a*) Paddington to Stoke Gifford. (*b*) Stoke Gifford to Newport.
-Reading. (*c*) Reading-Newport.

down expresses that the late arrivals at Newport range from 2¼ to 18 min., and average 9¼ min. per journey. The major part of the lateness cannot be put down to the locomotives, although three out of four occasions on which the load exceeded 400 tons showed loss of time against the engine, except on the last run of all, which was the miracle to which I have already referred. But the loss of time last mentioned stresses the well-nigh inexplicable fact that practically nothing but two-cylinder engines is ever forthcoming to work these important trains. Out of all the large number of the earlier four-cylinder 4-6-0 engines, let alone the big existing batch of "Castles," one would, at least, have thought it possible to set some aside for the working of such tremendous trains as often are found, for example, on the 8.55 a.m. and 7.55 p.m. down service. In this connection let me say that all these down runs took place before the coal dispute, so that imported coal cannot be held responsible for any loss of time by engines.

Then, again, the delays are most disheartening. I never remember publishing a table of runs on first-class expresses on which so many delays appear. True, all my down runs since the acceleration of the South Wales service are included, simply because various of the worst-delayed of them displayed what was actually the best running, from the locomotive point of view. Only a few of the delays, strangely enough, can be attributed to the gradients and the congestion arising out of the long block section through the Severn Tunnel, where one might reasonably expect some delay. Severe permanent-way slowings—one at Hanwell for the rebuilding of a bridge and at Shrivenham for relaying—accounted between them for 11 permanent-way checks, and the rebuilding of Newport station not unnaturally occasioned delay on every journey; in the latter case, in arriving at net figures, I have allowed a net time of 5¼ min. for running the 3·8 miles from Llanwern to the stop at Newport. Various other permanent-way and signal checks were scattered about, and included a dead stand at Little Somerford, two stops at Stoke Gifford to detach the Bristol slip portions, instead of slipping, and not a few checks outside Reading. Reading, too, was responsible for excess of time over the booked station allowance on two of the 8.55 a.m. runs and all of the 7.55 p.m. runs, averaging 1½ min. in the former case over the allow-

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ance of 4 min., and 3¼ min. over the allowed 5 min. in the latter. Didcot, on the other hand, is now completely reformed, and not a suspicion of a check there was encountered on any one of the 14 runs described in this article. Delays from all sources, as nearly as I can estimate, accounted for an *average* of 11¾ min. on all trips, which can be reduced to 10½ min. if the three Badminton stops are included as part of the normal working of the 3.55 p.m. down. To revert to the engines,

GREAT WESTERN RAILWAY.

11.45 A.M. BRISTOL-PADDINGTON.

Engine: 2-cyl. 4-6-0 No. 2975 *Sir Ernest Palmer*. Load: 241 tons tare, 255 tons full.

Distance.		Schedule.	Actual.	Speeds.
miles.		m.	m. s.	m.p.h.
0·0	Bristol	0	0 00	—
			Sigs.	
1·6	Stapleton Rd. ..	4	4 45	—
			p.w.s.	25
2·5	Ashley Hill ..	—	6 40	—
4·8	Filton Junc. ..	9½	11 20	25½
8·3	Winterbourne ..	—	15 10	55½
13·6	Sodbury ..	—	20 30	64
17·6	Badminton ..	25	24 55	61
23·4	Hullavington ..	—	30 05	74
27·9	Little Somerford	—	33 40	77½
30·6	Brinkworth ..	—	35 55	61½
34·7	Wootton Bassett	41	39 45	52
40·3	Swindon ..	47	45 40	—
46·0	Shrivenham ..	—	51 00	68
51·0	Uffington ..	—	55 20	72½
53·7	Challow ..	—	57 30	75
57·2	Wantage Rd. ..	—	60 20	77½
61·1	Steventon ..	65	63 20	79
64·5	Didcot	68	65 55	80½
69·1	Cholsey ..	—	69 45	70½
72·9	Goring	—	73 00	68
76·1	Pangbourne ..	—	75 55	70½
			eased.	
79·0	Tilehurst ..	—	78 30	—
81·6	Reading ..	83½	81 00	56
86·6	Twyford ..	—	86 05	66
93·4	Maidenhead ..	94½	92 05	71½
			eased.	
99·1	Slough	100	97 40	66
104·4	W. Drayton ..	—	102 35	64½
108·5	Southall ..	109	106 30	—
			p.w.s.	15
111·9	Ealing	—	111 40	—
113·3	Acton	—	113 15	68
116·3	Westbourne Park	—	116 05	—
117·6	Paddington ..	120	119 10	—

Net time: 115½ min.

it will be seen that they showed themselves capable of running at well under their scheduled allowances with each train, provided the load did not exceed 400 tons.

As regards gradients, it may be mentioned that from Paddington to Didcot the line is as near level as makes no matter, after which for 17 miles it rises, at the faint inclination of 1 in 754–880 for the most part, to the seventieth milepost. There is a slight drop at 1 in 660 before Wootton Bassett, where on most runs speed was reduced to 50–55 m.p.h. for the junction. Then follow 5 miles falling past Brinkworth, 8¾ miles rising almost to Badminton, and 11 miles falling from Badminton station, entirely at 1 in 300. Speed is reduced to about 45 to 50 m.p.h. from Stoke Gifford to Patchway, whence the sharp descent at 1 in 80–68 of the down line produces some thrilling accelerations, if the driver be so minded, ere the train strikes the mile of level to Pilning. After this come 3½ miles falling at 1 in 100 to the centre of the Severn Tunnel, over which speed is generally kept strictly moderate, followed by 3 miles' rise out of its abysmal depths to Severn Tunnel Junction, where the difficulties of the engine are at an end. The speed of heavy trains at the summit of the last-mentioned climb is usually low enough to obviate the necessity of any special slack over the crossings at the London end of the junction station.

And now for the runs. All but the second and fourth, which were timed by the correspondent whom I quoted as taking exception to my neglect of this route, were of my own timing. On the first run *Saint Benedict* reached 71½ m.p.h. at Slough, did not fall below 65 at Twyford, touched 70 again at Pangbourne, and was running nicely at 65 up from Didcot when the first check befell, at Challow. By an astonishing acceleration we then reached 70 at Shrivenham, only to be pulled up by the p.w. check between there and Swindon.

Some more quick acceleration produced a speed of 69 an hour before Wootton Bassett, and then 72½ beyond Brinkworth, after which our minimum up the 1 in 300 before stopping at Badminton was 55½ m.p.h. In the subsequent descent, after a very rapid start (whereby we passed into the Severn Tunnel, 18·1 miles from Badminton, in 18¼ min.),

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we touched 76½ m.p.h. before slowing at Stoke Gifford. Up out of the Severn Tunnel our minimum speed was the excellent one of 31½ m.p.h. on the 1 in 90. This was a fine journey, apart from delays, and after careful calculation, I make the net time from London to Newport (with a not strictly admissible allowance for the Badminton stop) just under "even" time.

One of the most unchecked of all the journeys was that of *Hampton Court* in the second column, and the driver made full use of his opportunities, keeping in front of time the whole way to Patchway. The start was brilliant, speed rising to 67 m.p.h. as early as Southall, no less than 75 at Slough, and not falling below 70 by the time Twyford was passed, "even time" from the start being now more than achieved. The signal check at Reading was only to a little under 60 m.p.h., but the driver now took things a shade more easily, getting up to 68 an hour at Cholsey, and then falling to a general rate varying between 60 and 63 m.p.h. on to Swindon. At Brinkworth the maximum was 67 m.p.h. and the minimum before the Badminton stop was 57½ m.p.h. The 100 miles from Paddington had been run in 99 min. 20 sec. to the stop. Before and after Patchway 70 m.p.h. was the highest speed reached; then came a signal stop for 25 sec. at the East end of the Severn Tunnel. Notwithstanding this, the train passed Severn Tunnel Junction only ¾-min. late, and after very little in the way of concluding delays, made Newport in the lowest actual time of any, and only 2¼ min. late.

On the third trip, too, *Fawley Court* had a fairly undisturbed run, passing Patchway on time after p.w. checks at Hanwell and Shrivenham, but, for once, no Badminton stop. Speeds were 68 m.p.h. at Slough, 61½ at Twyford, 67 at Goring, and a steady 65 up the rising grades from Didcot until the Shrivenham slowing. After Wootton Bassett we touched 72½ m.p.h. beyond Brinkworth, fell to 52½ up the ascent to Badminton, and maintained 69 down past Winterbourne. The signal check at Pilning was very severe—to 10 m.p.h.—but we maintained a minimum of 29 m.p.h. to Severn Tunnel Junction.

On the fourth journey *Robin Hood* made another fine start, crossing the "sixty" line before Southall, passing Slough at 74—with 360 tons—and maintaining 66 to Twyford, but only to meet the most devastating series of signal checks through Reading, costing at least 6 min., if not more After this speed barely rose above the mile-a-minute rate until after Didcot, whenceforward the driver showed great energy over the slight rise to Shrivenham, maintaining 65 to 67 m.p.h. all the way up, and getting up to 70 on through Shriven-

GREAT WESTERN RAILWAY.

1.10 P.M. SWINDON-PADDINGTON.

Distance.	Engine, 2-cyl., 4-6-0 ,, Name Load (Tons tare) ,, (Tons full)	Schedule.	2921 *Saint Dunstan* 311 330	2972 *The Abbot* 356 375
Miles.		Min.	m. s.	m. s.
0·0	Swindon	0	0 00	0 00
5·7	Shrivenham ..	—	8 20	8 20
10·7	Uffington	—	13 00	13 10
13·4	Challow	—	15 20	15 35
16·9	Wantage Rd. ..	—	18 15	18 45
20·8	Steventon	22	21 30	22 05
24·2	Didcot	25	24 20	25 00
28·8	Cholsey	—	28 30	29 10
32·6	Goring	—	31 55	32 25
35·8	Pangbourne ..	—	35 00	35 15
38·7	Tilehurst	—	37 40	37 45
41·3	Reading	43	40 05	40 10
46·3	Twyford	48	44 35	44 50
53·1	Maidenhead ..	54½	50 40	51 00
58·8	Slough	60	55 45	56 00
64·1	W. Drayton ..	—	60 25	60 50
				p.w.s.
68·2	Southall	69	64 15	65 10
71·6	Ealing	—	67 20	68 40
73·0	Acton	—	68 35	70 10
76·0	Westbourne Park	—	71 35	73 20
77·3	Paddington ..	80	74 15	76 00

ham and Swindon, after which came another signal check. At Brinkworth the speed was 67 m.p.h., and before Badminton 53½ m.p.h.; net time for the 100 miles from Paddington to Badminton was probably not more than 98½–98¾ min., start-to-stop. A maximum of 70 m.p.h. was reached at Winterbourne, but a signal stop occurred beyond Severn Tunnel Junction, causing further delay, so that eventually the train was over 10 min. late; the net time, to my reckoning, did not exceed 135½ min. So much for the 3.55 p.m. down.

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The runs on the 8.55 a.m. down Fishguard train begin with one when an unusually light load was carried, consisting only of three 70-ft. coaches, three 60-footers and a "triplet" restaurant-car set. Despite the moderate p.w. check in the early stages, we were a little before time through Twyford, although not having exceeded 66 m.p.h. at Slough; a signal stop outside Reading, however, sufficed to lose us 5½ min. For once the station stop was cut by 1¼ min., and we left Reading 3¼ min. late. By Wootton Bassett *Lady of Quality* had picked up the arrears, reaching 66 m.p.h. at Didcot, by the signal check before Swindon, was moderate, speed varying all the way between 60 m.p.h. (at Challow) and a maximum of 64 (at Steventon). Once on the Badminton line, however, *Lady of Quality* did some brilliant work, gaining 3¼ min. over the hardest part of the booking, between Wootton and Severn Tunnel Junction. We touched 70½ m.p.h. beyond Brinkworth, never fell below 57 an hour on the ascent to Badminton, attained 79 m.p.h. at Winterbourne, and 75 after the Patchway slack, finally, after a scrupulous observance of the prescribed caution through the tunnel, breasting the

Photo.] DOWN FAST GOODS ON L.N.E.R. NEAR HADLEY WOOD. [*H. Gordon Tidey.*

G.N. 2-6-0 locomotive No. 4695.

and maintaining from 65 to 66 m.p.h. from there on to Shrivenham. After that the going was most leisurely, and requires no further comment; but a p.w. slack in the Severn Tunnel and the usual slowing outside Newport brought us in 3 min. late. We had, however, maintained schedule time from Reading to Newport.

On the next trip the same engine had a considerably more substantial train. There was a slow recovery from the severe Hanwell check, but at Twyford we had worked up to 67 m.p.h.; nevertheless, with overtime at Reading we left there 3¾ min. late. From here to Wootton Bassett the locomotive work, not assisted top of the rise out of the tunnel at 34 m.p.h. I fancy we should have been on time into Newport, but for the two concluding checks.

With 435 tons out of Paddington, *Tockenham Court* appeared overloaded, although the driver just managed to show no actual loss of time against his engine, save for a modest ½ min. on the second stage. Maximum speeds were 62½ m.p.h. at Slough, 64½ from Goring to Cholsey, 67 at Brinkworth, 68 at Winterbourne, and 74 beyond Patchway, while the most important minima were 52 an hour at Badminton and 33½ at Severn Tunnel Junction, both of the latter being excellent figures.

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On the last of the 8.55-a.m. runs, *Dorney Court* was very manifestly overloaded, and had, in addition, to contend with a furious westerly gale and rain. In the circumstances the loss of only 1¼ min. out to Reading was very creditable, as was also the maximum attained speed of 66 m.p.h. at Slough; by Twyford, however, we had fallen away to 58½ an hour. Onwards from Reading, where we spent 2 min. overtime, and so started 3¼ min. late, we just managed to attain 61 m.p.h. in the shelter of the cuttings beyond Pangbourne, but the speed from Didcot to Swindon was mostly about 56 m.p.h. After Wootton Bassett slack we touched 64½ m.p.h. at Somerford, and mounted to Badminton at a minimum rate of 43½ m.p.h., but I should imagine that the water level in the boiler had then got low, as we descended to Stoke Gifford at a speed which took long to reach 60 m.p.h., and did not exceed that figure. Down to the tunnel our maximum was 68 m.p.h., and out of it the minimum was 31½ m.p.h. Fourteen vehicles were taken out of Paddington on this trip, four of them being in the Bristol slip portion.

And now, lastly, for the runs on the Fishguard boat express. On the first of the three runs, *Cefntilla Court* had about the lightest loading that is ever seen on this train, and performed some of the most brilliant running in the table, while at the same time suffering the most disheartening series of checks of any of the runs. Out to Reading we touched 69 m.p.h. at Slough, and maintained 65 past Twyford and Sonning. From Reading, left 1¾ min. late, we ran with somewhat unaccountable ease to Didcot, but there things brightened up tremendously, so that we passed Challow at 66 m.p.h., Uffington at 67, Shrivenham at 69, and Swindon, where the engine was slightly eased, at 65. From Didcot to Wootton Bassett the engine, therefore, picked up 2 min. Then, when we were going at no less than 74 m.p.h. in the Brinkworth "dip," there came the tragedy of the Little Somerford signal stop. To the driver's credit be it said that he accelerated from the stop, up the continuous 1 in 300, to 57½ m.p.h. before Badminton; after that there was an exceedingly bad p.w. check through Sodbury, and then, when we had touched 70½ m.p.h. at Winterbourne, we were pulled up at Stoke Gifford to detach the slip. Still the driver tried to regain lost time; touching 72½ m.p.h.

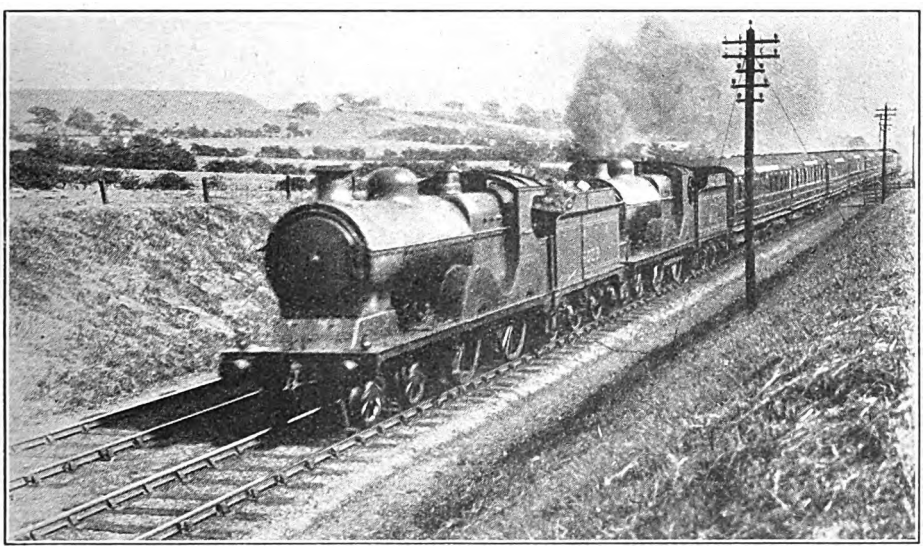

Photo.] [*Wm. Carter.*

BOURNEMOUTH-NEWCASTLE EXPRESS, S., G.W., AND L.N.E. RAILWAYS.

G.C. 4-4-0's No. 6023 and 6017, with latest L.N.E. Stock.

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before the tunnel, and coming up to Severn Tunnel Junction at a minimum of 35½, he gained 1¼ min. from Patchway to this point, but further severe loss occurred outside Newport, and we arrived 11¾ min. late. I reckon, however, that the driver had 6¾ min. net economy on schedule times to his credit.

The same engine on the next run, with a 13-coach train of 450 tons, was overloaded, and showed it. We touched 65 m.p.h. at Slough, but lost 3½ min. to Reading, of which not more than 3 min. can be debited to the Hanwell slowing. By reason of the latter and of station overtime, we left Reading 7 min. late. We reached 64 m.p.h. at Didcot, and by dint of hard work the driver managed to keep the speed just above the "sixty" line on to Shrivenham, the lowest rate before the p.w. check being 61 an hour. An unusually severe slack was made at Wootton Bassett, after which we topped Badminton at the excellent rate of 52 m.p.h. Various checks followed, however, as a result of which we reached Newport 18 min. late.

Last of all there comes the extraordinary run shown in the last column. Had it not been for the bad timekeeping, I should have been strongly inclined to include this as one of my "best runs" in the February article. The load consisted of ten 70-ft. 8-wheelers, including 70-ft. "diner," a sleeping car (ex-L.S.W. type), and three 60-ft. coaches, making a gross load of 485 tons. Out to Reading we lost 50 sec., touching 65 m.p.h. at Slough and maintaining 64 past Twyford. From there I really thought we must be piloted, until I confirmed, both at Stoke Gifford and at Newport, that this was not the case. Pangbourne was passed at 60 m.p.h., Goring at 61½, Cholsey at 65 and Didcot at 66, after which the rate fell gradually to 61½ at Wantage Road, and 61 from Uffington to Shrivenham. Between the Shrivenham slowing and that at Wootton Bassett we got up to 64 m.p.h., which was also the attained speed at Little Somerford. Then, finally, perhaps the most amazing feat of the trip was the maintenance of a minimum speed of no less than 55½ m.p.h. right up the 1 in 300 to Badminton. There was no subsequent slackening of effort, but we reached 74 m.p.h. at Winterbourne, before a very severe signal slack heralded the out-of-course stop at Stoke Gifford, to detach the slip. Without this we should have passed Patchway in barely ½-min. outside the booked allowance of 79 min. from Reading. Down to the tunnel we did not exceed 69 m.p.h., but coming out of it we fell to 24;

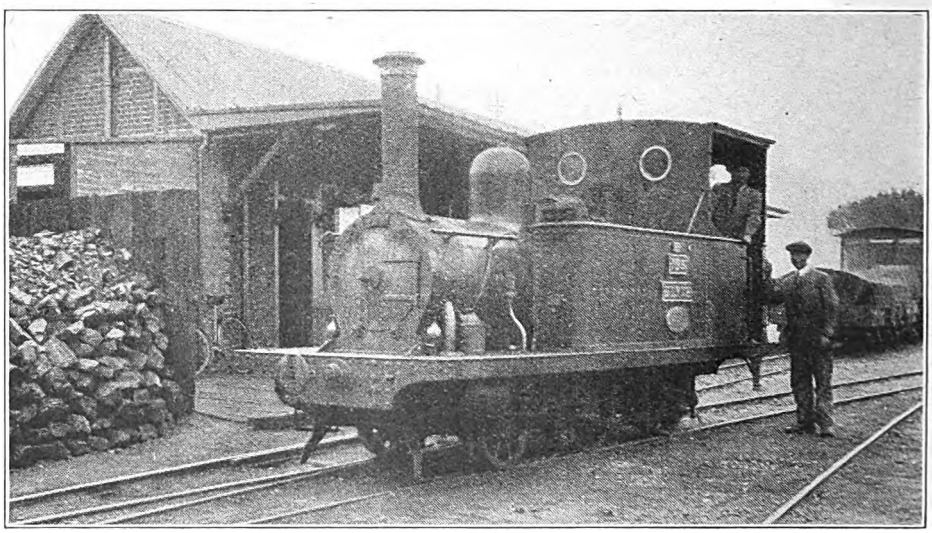

Photo.] [*G. O. Wallis-Palmer.*

2-4-0 LOCOMOTIVE NO. 3 "BLYTH," SOUTHWOLD RAILWAY.

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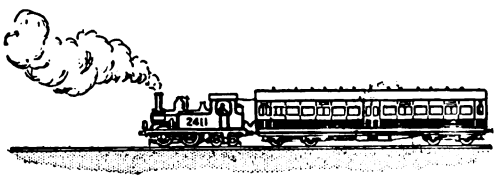
between Magor and Llanwern, however, we reached 64½ m.p.h. That there should be no time to book against the engine on this journey was, I consider, a tribute to masterly driving.

Last of all, to complete this survey of the work of the 2-cylinder 4-6-0 engines, I show, in separate tables, a run on the 11.45 a.m. up Bristol express, and two on the 1.10 p.m. train from Swindon to Paddington, on which some very cheerful running is frequently seen. The Bristol journey, whose *en route* speeds, as well as times, are shown in its table, was little more than normal in character. In the early stages its chief feature was the rapid acceleration from the minimum speed at which Ashley Hill bank had been ascended—25½ m.p.h. —to no less than 64 m.p.h. at Sodbury, and almost exclusively *up* 1 in 300. Again, after a slow recovery from Wootton Bassett, we worked up quickly in speed from Shrivenham till the "eighty" line was just crossed at Didcot. From here onwards there was little of note to record, the train being well in front of time, and finally we arrived 50 sec. before time, having achieved a net time of 115½ min. for the 117·6 miles.

The 1.10 p.m. up from Swindon is a much heavier train than its more famous cousin, which leaves at 3.45 p.m., but the 75-minute allowance of the latter is not infrequently worked to. The first of my two runs, indeed, bettered it by ¾ min., and showed a clear gain of 5¾ min. on schedule. This was the more remarkable in that the run concerned was made during the period of the coal dispute, and the absolutely continuous stream of black smoke which issued from the engine chimney was in itself witness to the fact that firing must have been going on without intermission. More honour to the crew for so enterprising an effort! We passed Shrivenham at 61½ m.p.h., Uffington at 68, Challow at 70½, Wantage Road at 72½, and Didcot at 74, after which speed fell away to 64 at Pangbourne; then it rose once again to 67 at Reading, and with a brief intermission of 65 at Sonning, to 67 at Twyford and 70½ at Slough; thenceforward it varied between 67 at West Drayton and Old Oak and 65 at Southall. We thus arrived dead on time after a start nearly 6 min. late.

The other run, well before the coal dispute, was with a heavier train of 375 tons, and, again, a 2-cylinder engine. This time the speeds were 61½ m.p.h. at Shrivenham, 66 at Challow, 70½ at Didcot, 68 at Cholsey, 64½ at Sonning (Reading), and 70½ at Maidenhead and Slough, while after the Hayes permanent-way check we worked up to 62½ m.p.h. before slowing for Westbourne Park. Net time on this trip was about 74¾ min. for the 77·3 miles from Swindon to Paddington. It is wonderful that these 2-cylinder Great Western 4-6-0 engines can still put up such feats of both speed and load haulage as are embodied in these tables, in view of the fact that the main lines of their design date back for something like a quarter of a century.

Acknowledgment is due, in conclusion, to the following correspondents, who have written me during the past month:— Rev. A. G. Brown, Dr. T. H. Kirk, Messrs. T. A. Bacon, H. Chapman, Aidan Craven, M. G. Cowlishaw, A. S. Gledhill, H. Dixon Hewitt, A. H. Holden, Chas. Hutton, H. F. Maybank, H. M. Pearson, R. J. Price, A. D. Pordige, L. J. Slatter, M. W. D. Spelman, and R. H. Timmis. Several of these letters are of considerable interest, and certain of the matters they discuss or the runs they enclose will be dealt with at a later date. Other letters have been answered privately, or will be dealt with in the "Why and Wherefore" columns.



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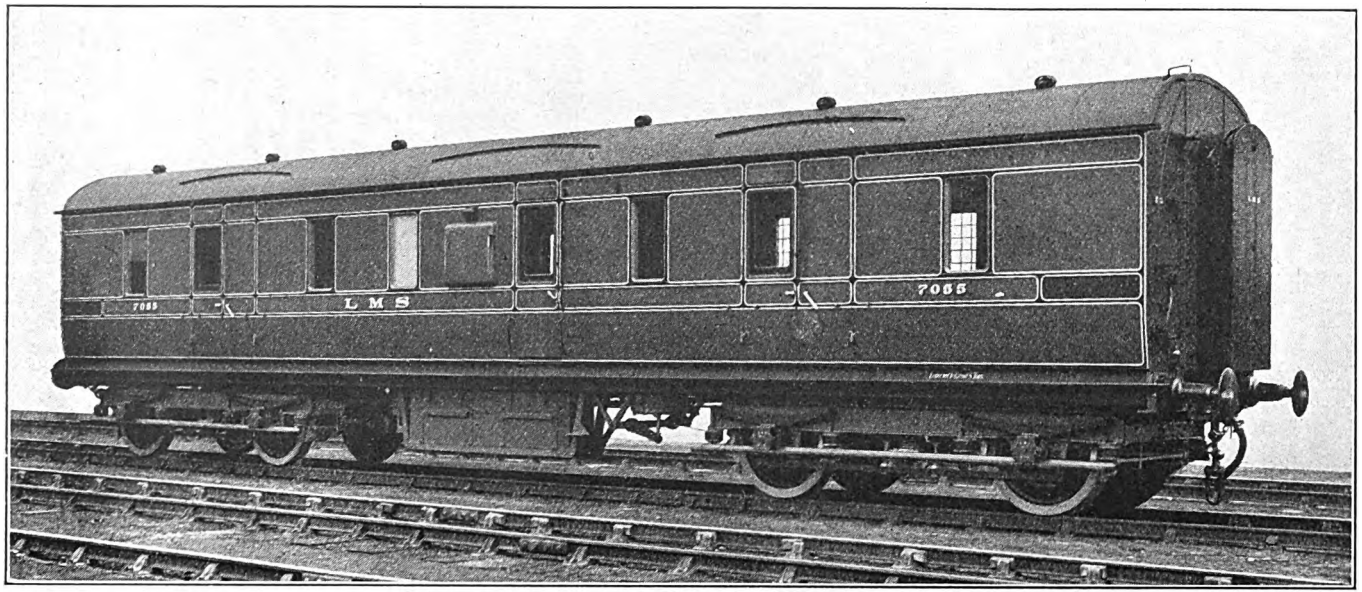
NEW PASSENGER BRAKE VANS, L.M.S.R.



A NEW type of bogie passenger brake van has just been placed in traffic on the London Midland & Scottish Railway, 100 of which are being built by the Birmingham Railway Carriage & Wagon Company and the Metropolitan Carriage, Wagon & Finance Co. Ltd. Steel and metal are used wherever practicable. Standard English gangways are fitted for running in conjunction with main-line corridor trains, but the overall dimensions of the vans are such as to make them available throughout the British railway systems. The vehicles will carry a load of 8 tons equally distributed, and the tare weight is 28 tons.

Length over buffers	53 ft. 8 in.
Length over body	50 ft.
Centres of bogies	33 ft. 6 in.

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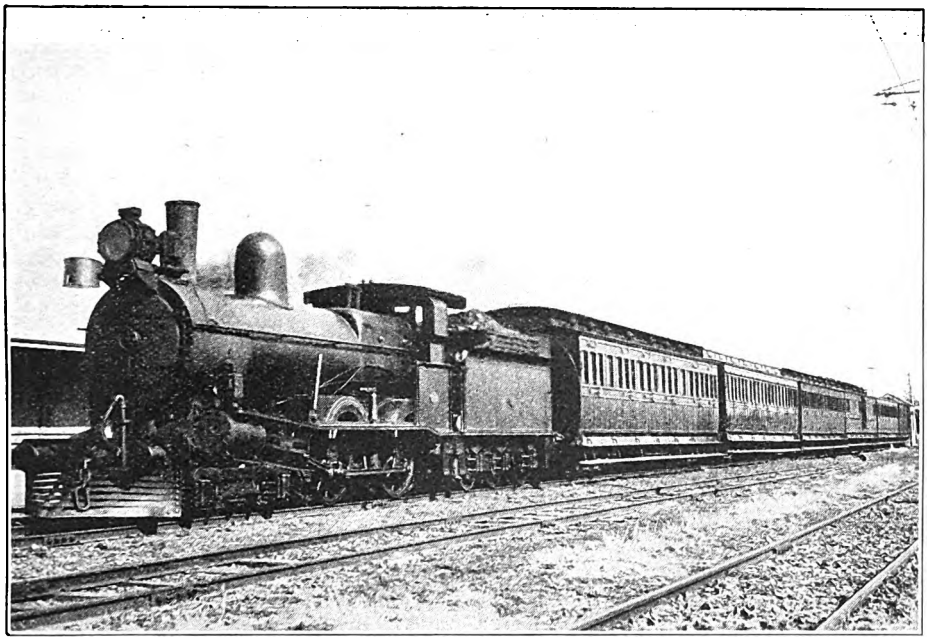

BOAT EXPRESS READY TO LEAVE LAUNCESTON QUAY FOR HOBART.

The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

VII.—TASMANIAN GOVERNMENT RAILWAYS.

THE railway system of Tasmania is, naturally, the smallest State system in Australasia. It comprises 648 miles of 3 ft. 6 in. gauge and 25 miles of 2-ft. gauge, the average miles open for traffic for the year ending June 30, 1924, being 667¾. Railway construction has been progressive—and possibly too hasty, judging from present conditions—as over 150 miles have been added during the past ten years. Tasmania has about 217,000 inhabitants, these being distributed over an area of 26,215 square miles. The island is roughly 200 miles from north to south, and the same distance east to west. A great central range of mountains traverses the country from north-west to south, and has many lateral spurs. An extensive plateau occupies the centre of the island, with an elevation on the northern side of from three to four thousand feet above the sea.

Tasmania enjoys a mild, equable climate, and is extremely favourable for agriculture. It has a world-wide reputation for its magnificent fruit products, being called the garden of Australia, while to dwellers on the mainland of Australia it is best known as an ideal holiday resort, which thousands visit every year. There are two important cities in the island. Hobart, the capital, situated on the River Derwent, in the south, possesses one of the finest harbours in the world, with a depth of water at the wharves of 62 ft., while Launceston, a city of 30,000 inhabitants, is picturesquely situated on the River Tamar, to the north of the island. Regular steamship services are maintained between Tasmania and the mainland, the principal being a service three times a week in each direction between Melbourne and Launceston, express trains connecting with Hobart.

At June 30, 1924, the Tasmanian

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Management Act. With the exception of the Chief Mechanical Engineer and the Permanent Way Chief Engineer, whose headquarters are at Launceston, all the chief officers are stationed at Hobart, the capital of Tasmania. The Secretary's Branch carries out the duties of the Administrative Office of the Commissioner, and, under the direction of the Commissioner, keeps in touch with the work of all branches of the Department. Industrial and staff matters generally are dealt with by this office. The total staff of the Tasmanian railways numbers 1,596, of which 190 are members of the salaried staff.

Operating Difficulties.

Owing to the mountainous character of the country through which the Tasmanian railways pass, heavy gradients and sharp curves abound, and, as a consequence, train loads are comparatively low and the cost of haulage relatively high. There are many miles on the gradient of 1 in 40 and hundreds of 5- and 6-chain curves. On the 25 miles of 2-ft. gauge running along the West coast, which lines were built to serve the mining fields when they were active, but which are now used only to a limited extent, the gradients run up to 1 in 25 with curves as sharp as 1½ chains.

Until the recent introduction of the new 4-6-2 passenger and 4-8-2 freight engines, which are described later, the maximum load hauled on the ruling grade of 1 in 40 was 120 tons. This, of course, excludes the "Garratt" engines, two of which were obtained in 1912, as they will haul 304 tons on a 1 in 40 grade and have proved to be very effective engines. The newer locomotives of the "Pacific" and "Mountain" types of about 100 tons weight, which were obtained in 1922, have enabled maximum loads on ruling gradients to be increased from 120 to 230 tons.

The sparsely populated character of Tasmania and the general traffic conditions prevailing in that small island render it impossible to run separate passenger and goods services except to a strictly limited extent, and it is necessary, therefore, to run mixed trains very largely on both main and branch lines. On many lines such trains are only run on one or two days per week, and even then the resultant revenue does not always warrant the maintenance of such a service. While there are the usual objections to the running of mixed trains from the point of view of making a slow service for passengers, it is impossible to accelerate the trains unless a reduction is made in the freight-carrying capacity of the trains, and that would mean additional expense. The solution of the difficulty seems to be in the direction of providing rail vehicles of the motor-car type with a capacity of from 30 to 60 or 80 passengers, so as to run a separate passenger service and maintain a goods service at intervals as required. The possibility of effecting improvements by this means is receiving careful considerations, and an order has already been placed in England for new rail cars.

The best service in Tasmania is the up and down boat-express train running between Launceston and Hobart, a distance of 133 miles. In order to allow for the late arrival of the boat at Launceston —there is sometimes difficulty in berthing owing to the tide—six paths are plotted for the run of the Launceston-Hobart express train. The time taken for the run varies between 5¼ and 5½ hours, exclusive of the stop at Parattah, where 20 minutes or more is allowed for luncheon, but when consideration is given to the extremely difficult nature of the country negotiated by these 3-ft. 6-in. gauge trains, the time taken on the journey, which I took in both directions on my recent tour, is by no means of undue length. This service will considerably be improved as soon as the new corridor stock now being built at the Launceston workshops is placed in traffic, and will then doubtless have the effect of attracting still more passengers from road transport.

Locomotive Developments.

On June 30, 1924, the Tasmanian Government Railways had 96 locomotives on the books, 7 of these, with an aggregate tractive capacity of 82,881 lb., being for service on 2-ft. gauge lines. The balance of 89 had an aggregate tractive capacity of 1,315,899 lb., or an average of 14,785 lb. The policy of the department is to provide more powerful engine units in order to reduce the cost of haulage, and within the last two years six "Mountain" and four "Pacific" type locomotives built in Australia have been added to the stock. The "Mountain" type, or "Q" class, loco-

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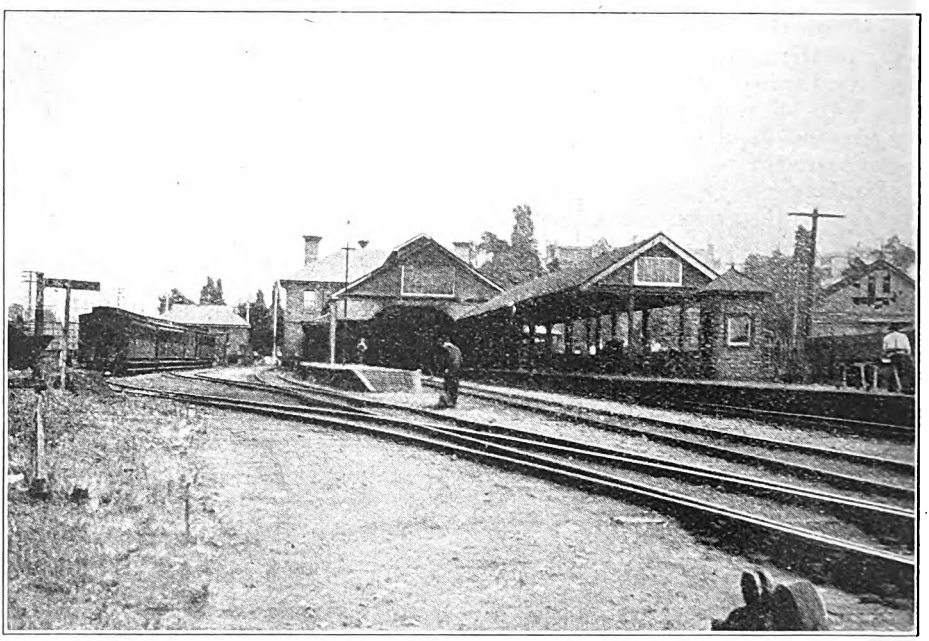
motive has a total weight in working order of 103 tons 19 cwt., has fuel capacity of 6 tons and carries 3,500 gallons of water. It is superheated and has a working pressure of 160 lb. per square inch. With a length of 62 ft. 10¾ in., the total wheelbase is 53 ft. 5¾ in. The total heating surface is 1,757 sq. in. Its tractive power at 80 per cent. is 25,600 lb. The "Pacific" or "R" class locomotive weighs 97 tons 15 cwt. 3 qr. in working order, has similar fuel and water capacity to the "Q" class, and a tractive power at 80 per cent. of 22,340 lb. It is superheated and has a working pressure of 160 lb. per square inch.



GENERAL VIEW OF HOBART STATION.

The total wheelbase is 50 ft. 10¼ in. and the overall length 60 ft. 2¼ in. Both locomotives have a large capacity boiler, this being essential on the Tasmanian system, which consists of lines with long steep grades combined with sharp curvature. It is anticipated that industrial developments in the Hobart area will require increased passenger facilities, and with this in view, a design for a 4-6-4 suburban tank of 22,340 lb. tractive power with details interchangeable with the 4-6-2 and 4-8-2 types mentioned above has been developed.

Conversions from the old "C" class locomotive, of which there are 24 in service —total weight 49 tons and tractive power 11,620 lb.—into a heavier type are in progress in the departmental workshops at Launceston, giving an increase in tractive power of about 33 per cent. This converted type is to be used for goods working on branch lines. Superheating, improved valve motion, bogie design and spring compensation are features of these locomotives.

Coaching and Goods Stock.

Coaching stock on the system comprises 238 vehicles, six of these being for the 2-ft. gauge. Of the 232 for the 3-ft. 6-in. gauge there are 16 first, 35 second, and 82 composite cars, while 46 brake vans and 38 horse-boxes account for the majority of the balance. The long-distance car generally used at present is the "ABL" class. This is a non-corridor composite car having three first- and three third-class compartments respectively, accommodating 22 and 28 passengers. Its approximate weight is 18 tons 5 cwt. 2 qr. Preliminary designs have, however, been prepared for corridor stock, and when these cars are built they will be provided with all modern facilities. Another type of car, the "BBA" class, built especially for excursion and

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suburban traffic, and accommodating 100 passengers, shows the ratio of 504 lb. per passenger. The carriages generally on the Tasmanian system are fitted with the Stone electric light system.

Rail motor-cars with Drewry chassis and locally-built bodies are in service on spur lines giving good results, and further developments in motor traction are anticipated in the near future.

The freight stock is represented by 1,797 vehicles, this excluding 61 service vehicles. 77 open goods wagons, with an average tonnage capacity of 13·2 tons, are in service on the 2-ft. gauge line, while 1,096 open goods wagons, with an average tonnage capacity of 8·04 tons, are used on the 3-ft. 6-in. gauge. 177 box wagons, 104 cattle wagons, 125 bolster wagons, and 47 flat wagons are also included.

A batch of high-capacity bogie wagons of 25 tons rated capacity is at present under construction in the Launceston shops. A tare ratio of 2·5 has been attained in this design, being a much better figure than for the older types of general purpose four-wheeled wagons. The design has been developed from an earlier class of timber wagon, but it was considered that the cubic capacity would, for a general purpose wagon, provide for a load of not more than 25 tons. Reductions in weight of framing and in other directions, whilst still keeping interchangeability of details in view, enable the tare ratio to be kept approximately the same as the earlier class.

The Tasmanian Railway Administration is greatly hindered in its attempts to secure additional traffic to meet the greatly increased cost of working by the fact that, owing to the short distances over which traffic is carried—the State being a small island with good roads and several ports—competition by road motor vehicles and also by coastwise steamer is very strong. This, naturally, has a serious effect upon railway revenue, and this problem is receiving the closest attention of the Minister for Railways and the new Tasmanian Railway Commissioner, with both of whom I had interesting interviews during my short stay in Hobart. A revision of the tariffs is being undertaken, and it is hoped by this means to secure the return of some of the traffic lost to the railway, while a Bill is shortly to be presented to Parliament providing for a seat tax on motor passenger-carrying vehicles. Additionally, fresh legislation is promised with regard to motor freight-carrying vehicles.

As previously noted, the traffic handled on the railways of Tasmania is not very heavy. For the year ended June 30, 1924, passenger train mileage was 671,816 and freight train mileage 744,400, making a total of 1,416,216 train-miles. The number of passenger journeys for the year was less than 3,000,000, while the total freight carried was slightly over 700,000 tons, general merchandise amounting to over 454,509 tons and minerals 227,818 tons. The principal traffics for the year were minerals, other than native coal, 179,637 tons, native coal 74,162 tons, timber 138,827 tons, firewood 77,003 tons, agricultural produce 87,996 tons, hay, straw, chaff, &c., 57,490 tons, and fruit 10,819 tons.

The two principal passenger stations are at Hobart and Launceston, while these places, together with Devonport, are the three main goods concentration points. The volume of business for these three places for the year ended June 30, 1924, was as follows :—

	Passengers.		Goods Tonnage.	
	Outwards.	Inwards.	Outwards.	Inwards.
Hobart ..	680,628	625,274	35,915	127,727
Launceston	118,237	168,503	32,967	108,475
Devonport	46,008	69,489	13,590	184,678

Owing to the lack of funds for development and also to the fact that railway extension in Tasmania has gone ahead fairly rapidly during recent years, it is not anticipated that the mileage of the system will be increased to any appreciable extent in the near future. Expenditure will, however, be made on track improvements in order, as far as practicable, to reduce the cost of haulage over the more difficult sections. During the last financial year the new shops at Launceston were completed and opened, and it is expected that these, together with the more up-to-date facilities provided at the new round-houses at Hobart and Launceston, will have the effect of ensuring a reduction in locomotive maintenance costs.

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RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, *33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-ninth Annual Edition (1926) of this standard railway reference work is now published. All previous Editions are out of print.*

Locomotive Efficiency.

The large number and variety of factors which must be taken into account in the computation of comparative figures to show the efficiencies of different classes of steam locomotives are too involved to allow of explanation in these columns, and we must refer you to the detailed accounts of methods for arriving at the efficiencies of various forms of power plants, including locomotives, which form the subject-matter of portions of steam and other engineering text-books. We could not give a full explanation without going into the theory of heat, steam, and thermo-dynamics, and the space available does not allow of this. One of the principal factors involved is the boiler design. By calculating the energy contained in the amount of coal consumed in the firebox and comparing it with the amount of energy in the steam produced in the same time we can arrive at a figure showing the efficiency of the boiler. In passing the steam from the boiler to the engine, losses take place, and these are further increased by machine friction in the engine, &c., so that the actual power available at the point of contact of the rim of the drawing wheel and the rail is very small when compared with that contained in the amount of coal consumed in the firebox. Thus, the efficiency of the steam locomotive as at present running is low by comparison with the figures quoted for steam-power plants of a stationary type, using different boiler systems, &c. For an average figure representing the efficiency of a modern steam locomotive of usual design it is reasonably correct to quote about 6·5 or 7 per cent.

[Reply to H. R. U.]

Kirtley Locomotives, L.C. & D.R.

Arising from a reply in our Why and Wherefore section, February issue, on the subject of the Kirtley locomotives of the London, Chatham and Dover Railway, and to the list of these engines published in our November issue, Mr. H. Dixon Hewitt states that some at least of Kirtley's 0-6-0T's were in existence as recently as August, 1926, as two of them, including No. 600A, were on their old beat performing pilot duties at Victoria Station, Eastern section. Our correspondent is of opinion that the whole batch, Nos. 600–609 (L.C. & D., Nos. 141–150), are still at work. These were built at Longhedge in the years 1879–93, and if the two built in 1879 are still in service, they must be the oldest locomotives now working on the

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Eastern section, S.R. Longhedge continued to build locomotives for a short time after the setting up of the managing committee in 1899, and as late as 1902 two standard Wainwright goods engines of class "C," Nos. 592 and 593, were built there, though our correspondent states that he is uncertain whether these were actually the last engines constructed at Longhedge.

[Further reply to A. F. WIGRAM.]

Air Brake Pump Exhausts.

If you observe closely you will notice that the small puffs of steam exhausted from the chimneys of certain S.R. locomotives coincide with the rise and fall of the pistons and rod of the Westinghouse brake air compressor. It is the exhaust steam from this compressor, passing through a pipe into the base of the chimney exhausting into atmosphere, that causes the noise you mention. It is much louder and apparent in the case of small engines than in larger ones as the size of the smokeboxes are proportionately smaller. The S.E. & C. 0-4-4T's to which you refer were equipped with the Westinghouse brake for handling the L.C. & D. rolling stock which was originally worked with the compressed-air brake prior to the formation of the S.E. & C.R. Managing Committee. Since the electrification of portions of the Eastern section, S.R., some of these engines have been transferred to the Central section for working L.B. & S.C. stock, the major portion of which, of course, is still equipped with the Westinghouse brake only.

[B. S. POTTER.]

G.C. 4-6-0 Mixed-Traffic Locomotives.

We do not understand your first query. With regard to the second, the following dimensions may be given:—Cylinders (outside): diam., 21 in., stroke 26 in.; boiler barrel: length, 15 ft., maximum outside diameter, 5 ft. 6 in. Heating surface: large tubes, 591 sq. ft., small tubes, 1,050 sq. ft.; firebox, 174 sq. ft.; superheater, 308 sq. ft.; total, 2,123 sq. ft. Grate area, 26 sq. ft.; working pressure, 180 lb. per sq. in. Wheels, diam., coupled, 5 ft. 8 in.; bogie, 3 ft. 6 in.; wheelbase, engine, coupled, 15 ft. 3 in.; total, 27 ft. 6 in. Total engine and tender, 50 ft. 8½ in. Weight on coupled wheels, 53 tons 18 cwt. Total weight of engine, 72 tons 18 cwt. Total weight of engine and tender, 121 tons 4 cwt. Tractive effort at 85 per cent. of boiler pressure, 25,375 lb.

[Reply to "DIRECTOR."]

South Wales Expresses, G.W.R.

Such loads as 12 and 13 bogie coaches, with a triplet articulated restaurant set in addition, which you have noted on South Wales trains, are an exceedingly weighty proposition for 2-cylinder 4-6-0 engines of the "Saint" class, although such trains as the 8.55 a.m. and 7.55 p.m. expresses out of Paddington not infrequently reach even these maxima at the height of the season. We think, however, that you are probably in error in imagining all the coaches in these formations to be of 70-ft. stock; this is rarely the case, and the elliptical-roofed 60-ft. and 70-ft. coaches are easily confused. We may add that such loads as these would require pilot assistance through the Severn Tunnel; we have not the maximum unassisted load rating for "Saints" over this route.

[Reply to W. JONES.]

Consolidation Locomotives.

In view of the fact that W.D. 2-8-0 locomotives are now used on various sections of the group railways which own them, while similar engines built by individual companies prior to grouping are also used fairly extensively, it is impossible to answer your enquiry as to which section employs the largest number of engines of this type. You will, of course, remember that the G.W.R. has many such engines in service, while the type has been employed by the late Great Central, Great Northern, L.N.W., and Somerset and Dorset Joint Railways. There are no trains normally booked to pass Carlisle without calling.

[Reply to O. A. HACKING.]

L.N.E.R. "Pacifics" and Leeds.

Mr. J. A. Petrie suggests that the real reason why "Pacific" locomotives are not allowed to work from Doncaster direct to Leeds (Central), via Wakefield, is that they are too heavy for the bridge at Holbeck. Such engines can work into Leeds (Central) from the Harrogate direction without going over this bridge, which can also be avoided if they take a suitable route to get to and from the engine sheds.

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He suggests, also, that the Hughes 4-6-0 locomotives of the L.M.S.R. are taken off at Low Moor for the same reason, although the Aspinall "Atlantics" come within permissible limits.

[Further reply to H. SCOTT.]

Steepest Gradients.

Steepest gradients in this country over which passenger trains are worked are, as mentioned in the January issue, the 1 in 23 Causewayend and Commonhead inclines of the N.B. Section, L.N.E.R. We cannot say if the unassisted loads generally exceed 50 tons, but they certainly do up the 1 in 27 of Werneth incline, near Oldham, on the L. & Y. Section of the L.M.S.R. To our knowledge, the steepest gradient over which passenger trains are worked by ordinary adhesion methods is 1 in 14, on the electrically-operated Bernina Railway, in the extreme east of Switzerland.

[Reply to E. P. H.]

Old Great Eastern Stations.

We are not aware as to the exact dates when the stations mentioned by you were opened and closed, but may say that Mile End station was one of the original stations on the Eastern Counties line and disappeared somewhere in the 'seventies, owing to the fact that construction of Globe Road and Devonshire Street and Coburn Road stations rendered it superflous. Bethnal Green Junction was built at the time the extension to Liverpool Street was constructed. We do not recognise Ordnance Factory station, unless you refer to one near Enfield Lock replaced by the latter station.

[Reply to H. PELTIER.]

Waterloo and City Railway.

This is a tube line, now part of the Southern Railway system. There are no intermediate stations, though it has long been suggested that one should be constructed near Blackfriars Bridge. The difficulty is, we understand, that the line is at considerable depth there, and to provide a station would present many difficulties. We cannot understand why it is not shown on the maps you have seen. Presumably, the "excessive noise" you have noted on many Continental lines is due to the construction of track or of the rolling-stock.

[Reply to H. D. BULLOUGH.]

Caprotti Valve Gear.

This has been devised by an Italian locomotive engineer, and is, apparently, giving very good results in Italy. It is also being considered by British locomotive engineers, and this explains why L.M.S. locomotive No. 5908 has been fitted therewith. The valve gear is generally of the type wherein separate valves of poppet type are used for admission and exhaust and at the end of each cylinder. The operating gear is, of course, specially designed. In due course we hope to illustrate the gear.

[Reply to H. A. BRADBY.]

Letters on Southern Railway Coaches.

On certain trains letters are now affixed on the sides of vehicles, so that passengers booking seats can identify the vehicles to which they have been allotted. It is usual, when several engines are travelling together, for the brake connections to be coupled up. A number of articles have been published at one time or another dealing with the London and Brighton section of the Southern Railway, thought not in any issues which are still in print.

[Reply to A. GRUBER.]

Turbo-Electric and Turbine Locomotives.

The Ramsay turbo-electric locomotive, described in THE RAILWAY MAGAZINE for November, 1923, was tested by arrangement with the L.M.S.R. on their lines. The same course has been adopted with regard to the Beyer, Peacock Ljungström locomotive constructed recently. In both cases, however, the tests in question have been made by arrangement with the railway company. We are not aware as to whether or where the former locomotive is now in service.

[Reply to R. DYSON.]

The Longest Run in the World.

You are right in assuming that the record is held by the Great Western Railway, with the 225¾-mile run of the 10.30 a.m. down "Cornish Riviera

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Limited" express from Paddington to Plymouth (North Road). There is no run in Canada which approaches it in actual length of non-stop travelling, and even in the United States, the longest effort is over the 183 miles from Buffalo to Cleveland, by the New York Central Lines.

[Reply to "NON-STOP."]

The 5 p.m. Train from Marylebone.

Reference to the time-tables will show that this train is the equivalent to the 4.55 p.m. of 1923, as you suggest. Particulars of all L.N.E.R. named locomotives have already been given, but although it is generally against the rules of this section, we give those of the four engines mentioned by you as follow: Nos. 5258 *Rt. Hon. Viscount Cross, G.C.B., G.C.S.I.*, 5259 *King Edward VII*, 5364 *Lady Faringdon*, 5365 *Sir William Pollitt.*

[Reply to "MIDLOTHIAN."]

4-6-0 Locomotives, L.M.S.R.

Mr. E. W. Hodge explains that there are now 130 "Claughton" class locomotives, the new numbers of which are, or will be, 5900–6029; 20 of the original "Hughes" class, built in 1908; and 65 of the rebuilt superheater class, constructed in 1921. Of the original 20, 15 were rebuilt and superheated in 1921, while three have been scrapped. The "Hughes" locomotives are numbered between 10,400 and 10,484.

[Further reply to G. C. WILSON.]

Gradient Profiles, Midland Division, L.M.S.R.

The St. Pancras to Manchester route of the former Midland Railway was described, with a gradient profile, in the April and June, 1906, numbers of THE RAILWAY MAGAZINE, in the series of articles entitled "Gradients of our Chief Railways." These issues, as also all others containing similar profiles, have been out of print for many years.

[Reply to J. H. A. WILKINS.]

Light and Narrow-Gauge Railways.

The Weston, Clevedon and Portishead Railway is built to the standard gauge. We have no complete information as to the colours adopted for the locomotives of the Festiniog; Welsh Highland; Ravenglass and Eskdale; Weston, Clevedon and Portishead; Snowdon Mountain; Sand Hutton Light; and Corris Railways. Possibly some of our readers may be able to supply this information.

[Reply to "DOLAULT HALT."]

Southern Railway Mileage.

We had already noted that the mileage for the Southern Railway has diminished from 2,183, as given in 1925, to 2,180. We have no detailed information as to how the reduction has occurred, though it may easily be accounted for by the cessation of traffic on a little-known branch line, by the disuse of a connecting line somewhere, or as a result of the combination of several track alterations.

[Reply to "NORTHERNER."]

Double Heading.

While it is true that certain trains on the G.E. section of the L.N.E.R. are now frequently or regularly double headed, it does not follow that this is a permanent arrangement. It is being done in an endeavour to avoid some of the delays which have complicated matters recently and which are, partially at least, due to the fact that for a considerable period inferior foreign coal had to be used.

[Reply to A. C. H.]

Midland Expresses of the L.M.S.

The train publicly booked to leave Chesterfield for St. Pancras at 2.6 p.m. actually leaves at 2.9, and is booked to pass Trent at 2.46, Leicester at 3.9, Kettering at 3.40 and Bedford at 4.2 p.m. The 6.25 p.m. is booked to stop daily at Kettering, 7.43–7.45 p.m., and there is no conditional timing for a non-stop run.

[Reply to P. A. T.]

Double-Tracking Single Line Routes.

A number of sections of the line mentioned by you have been doubled since grouping, but we cannot give you exact details, either in regard to the late Cambrian or the late Midland and South Western Junction lines. We are also unable to inform you as to the average gradient between Cirencester and Chedworth.

[Reply to R. P. ANGUS LEWIS.]

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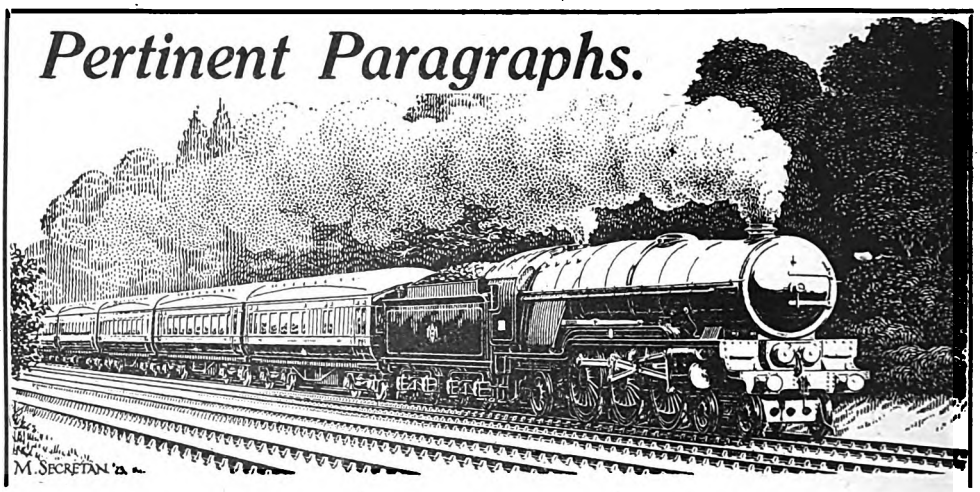
Pertinent Paragraphs.



L.M.S.R. Meeting.

THE serious difficulties with which the London Midland and Scottish Railway Company had to contend during the past most disastrous year were lucidly explained to the shareholders by Sir Guy Granet at the annual meeting. Of particular interest were the operating difficulties arising from the enforced use of foreign coal. The importation of foreign coal practically reversed the flow of coal traffic in this country, and normal routes were also upset by the unusual flow of English coal from areas where the pits were able to keep open. With the flow of traffic reversed and the ports becoming the place of origin rather than the place of destination, there was the difficulty of dealing with a large traffic without any of the siding and sorting facilities necessary for its quick handling. Then the abnormal routes for coal traffic meant longer hauls, so that wagons were under load for longer than usual, leading to the cry of shortage of wagons. As the price of the foreign coal increased its quality deteriorated, and not only produced less steam but had a bad effect on the locomotives, involving greater demand on the repair shops. Altogether, the direct gross damage inflicted on the company by the strikes was £16,400,000, of which £3,700,000 was accounted for by the additional cost of fuel, and of this loss over £5,000,000 had to be paid for by the wage-earner. On the subject of expenditure, the chairman referred to the substantial economies already effected since amalgamation, and to the expectation of still further economies likely to result from the company's expenditure on improvements. He also dealt appreciatively with the work of Sir Josiah Stamp, and to the appointment of Vice-Presidents. As to the future, Sir Guy Granet hoped for a freight traffic which would be an improvement on 1925, though he was not so sanguine as to passenger receipts.

Great Western Railway Meeting.

STOCKHOLDERS at the annual meeting of the Great Western Railway Company thoroughly realised the reasons for the exceptionally bad results of the past year, and were fully appreciative of the successful efforts of the management to reduce expenditure where that was possible. Throughout the proceedings there was a feeling of confidence in the Board and in the company's future, and there was no serious criticism. Viscount Churchill, in his analysis of the report and accounts, showed that on top of a saving of £900,000 in expenses in 1925 there had been a reduction in expenditure in 1926 amounting to £2,643,670, thanks to the splendid co-operation of the officers and staff. This was a very remarkable achievement in view of the fact that the additional cost of coal consumed in 1926, in consequence of increased price and higher consumption per mile, amounted to £714,000. The company has now no foreign coal remaining to be burned. The Chairman, in the course of his remarks, made appreciative reference to the work of Sir Felix Pole and the officers during the strike period of last year. As to the company's future prospects, it is the Chairman's opinion that the bad cycle has passed and is about to be succeeded by an era of prosperity. It was announced at the meeting as one of the hopeful signs that for the first time this year the company had secured an increase of £1,000 in the weekly traffic return.

Southern Railway Meeting.

AT the annual meeting of the Southern Railway the Chairman dealt with many matters of interest, and there was no sub-

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stantial criticism. The grievance of the former "A" stockholders had, of course, been met by the conversion scheme carried out under the Act of 1926, and the shareholders are entitled to congratulate themselves on the fact that the Southern was the only one of the four big companies to earn anything in 1926 on the "ordinary" capital. Its payment of the full 5 per cent. on the preferred ordinary and of 1¼ per cent. on the enlarged deferred stock is equivalent to a fraction over 3 per cent. on its ordinary stock treated as undivided, and so preserves the full trustee status of the prior stocks. Some striking figures as to the prosperity of the company for the first four months of 1926 previous to the labour troubles were given by the Chairman, who said that by the end of April the net earnings were some £200,000 better than for the corresponding period of 1925. In consequence of the coal dispute, however, the company's fuel bill was £500,000 higher than in 1925, and because of its being primarily a passenger line it was not able to reduce train mileage in proportion to the lessened traffic. The Chairman was unable to account altogether for the decrease in the current year's traffics, but estimated that the recent increase in goods rates might possibly give the Southern an additional annual revenue of £250,000. He gave a very interesting account of the satisfactory progress made in standardisation and of the good results of the new organisation. They had evolved nine types of locomotives, which would eventually supersede the 135 types in existence at the time of amalgamation, and they were now concentrating the building of new wagons at Ashford, of new locomotives at Eastleigh, and of new carriages at Eastleigh and Lancing. They were so satisfied with the results of electrification that the officers were now going into the question of its extension.

Metropolitan Railway Meeting.

LORD ABERCONWAY, at the Metropolitan Railway meeting, gave some striking figures illustrating the effect on the company's revenue for 1926 of the various troubles occurring in that year. The general strike in May last cost the company in actual loss of traffic and special payments £41,000; the loss in the carriage of coal due to the coal dispute was £43,000; increased price of foreign and other coal bought during the coal strike was £56,000; while the absence of the Wembley Exhibition traffic of 1925 meant a loss of £160,000. These several items amount to £300,000, which is equal to a 4 per cent. dividend on the ordinary stock. The Chairman justified the proposal to bring in £100,000 from reserves in order to pay a dividend of 3 per cent., by showing that the amount so brought in was earned on revenue account only two years ago. He also pointed out that the compensation money received from the Government for the use of the railway during the War was still intact. Dealing with the subject of road competition, Lord Aberconway pointed out that in 1924 the expenditure on road construction and maintenance was £51,000,000, towards which motor taxation contributed only £16,000,000, or 32½ per cent. Millions of money were being lavished annually by the country upon providing motor transport with the most perfect permanent way that engineering science could devise, quite regardless of the huge railway capital that was being jeopardised by the competition thus set up. So long as the railways were a necessity for the welfare of the people and of the trade of the country, so long ought Parliament to see that they had fair play. On the Metropolitan, longer-distance traffic is steadily increasing, but not yet at so great a rate as the short-distance inner London traffic is being taken from it by the road vehicles.

L.N.E.R. Meeting.

THE abnormal conditions of 1926 had prepared the shareholders of the London and North Eastern Railway for bad results, and at the annual meeting there was a general acceptance of the position, in spite of a certain amount of unhelpful criticism. Attention has very rightly been directed to the wonderful achievement during the first four months of 1926, when under ordinary conditions a saving of nearly £1,000,000 in net revenue was effected as much by economy in operation as by increase in receipts. Mr. Whitelaw also showed clearly, as Sir Guy Granet had done at the London Midland and Scottish meeting, what great sacrifices the railway companies had made in the national interest in carrying on ample services of trains during the exceptionally difficult months towards the end of the year, when locomotive fuel was very dear and very bad. Judging by some of their criticisms, many shareholders needed this reminder as much as the outside public. In view of the complaints of which a good deal has been heard recently as to delays both to passenger and goods traffic on the Great Eastern section, and of allegations that "the traffic is going to the roads," it was interesting to learn from the chairman that, on that section, the goods traffic in 1925 showed an increase of 20 per cent. over that of 1913, and in 1926, in spite of the strike, it had carried 600,000 tons more goods. Mr. Whitelaw had explained earlier the steps being taken to cope with the increase in goods traffic on that section which had

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formerly been mainly a passenger line, and referred to the construction of a new marshalling yard near March designed to eliminate congestion.

A New East Coast Service.

HITHERTO the 10.45 p.m. sleeping-car express for Newcastle-on-Tyne has constituted the last departure from King's Cross to the North. This entailed early morning arrivals at North Eastern Area stations, requiring an hour or two to be filled in before any business could be done. Hence the new service instituted on March 7, or, rather, on the Tuesday morning, at 1.15 a.m., will be appreciated by business travellers, in that the additional 2½ hours allowed in London enables the journey to King's Cross to be made by the last up suburban service or allows time for an evening at the theatre, whereas the early arrival hitherto necessary at Newcastle and other towns is practically useless time. The train is one already running for the conveyance of parcels and newspaper traffic, but arrangements have been made for passenger coaches to be attached and certain new facilities added. The first call is at Peterborough, giving connections to Boston and Grimsby (due 5.25 a.m.). At Retford a connection is given to Lincoln, and from Doncaster a portion is run express to Wakefield and Leeds (due 5.15 a.m.). The main train leaves Doncaster at 4.27 a.m. and is at York at 5.12-5.17 a.m., giving a connection to Scarborough due 8.22 a.m. Via Darlington, passengers can reach Middlesbrough at 7.54 a.m. and Sunderland from Durham at 8.50 a.m. The train reaches Newcastle at 7.12 a.m., whence connections are available on various routes. By using the 9.50 a.m. train, moreover, Edinburgh can be reached at 12.42 p.m.

Fleetwood and Heysham Steamship Services, L.M.S.R.

IN view of press references suggesting that it was contemplated to transfer the Fleetwood-Belfast steamers to Heysham, the situation was explained by Sir Josiah Stamp, President of the Executive, L.M.S.R., in a telegram to a provincial paper, reading as follows :—

At present the L.M.S. run steamship services for passenger and goods from Heysham and Fleetwood to Belfast, although the volume of traffic does not justify these competitive services. There are under construction at the present time larger and more up-to-date vessels for the North of Ireland traffic, and with their introduction it is proposed to concentrate the services in due course and the ships will sail from Heysham, and thus also afford greater facilities for the development of other growing activities at Fleetwood. Heysham and Fleetwood are equally accessible from London, and also from the Midlands.

It may be pointed out that the respective services owe their origin to competitive considerations which were of chief moment in pre-grouping and pre-war days. Now that both Fleetwood and Heysham are associated with the same group company, while the steamships concerned, previously London & North Western and Lancashire & Yorkshire Joint and Midland property, respectively, now come under the same ownership, it is obvious that a situation such as that which has arisen would have to be considered at one time or another.

Long Non-Stop Runs.

REFERENCE to the fact that water-troughs are being laid in on certain Scottish routes of the L.M.S.R. has given rise to suggestions that the company contemplated introducing non-stop expresses between London and Glasgow. For this there is, we understand, no foundation whatever, though with water-troughs available north of Carlisle it will be practicable to schedule trains to pass Carlisle without calling, if desired, and for the same engines to work both north and south of that city. In view of the importance of connections at both Crewe and Carlisle, it seems hardly likely that the day Anglo-Scottish services will be materially altered, unless it is found desirable to introduce, at busy periods, a relief train for through passengers only. In the case of the night sleeping-car expresses, however, most of the traffic is of a through character. Thus, for the last two years, a relief Highland express has occasionally been run through Carlisle, changing engines at Kingmoor running sheds instead, and it is by no means unlikely that certain trains may, in future, change engines (or enginemen) at some point between Crewe and Carlisle instead of at both those stations, or near them. Obviously no one engine crew could be expected to work non-stop for a distance of 400 miles or thereabouts. The conditions of the eight-hour day and consideration for the men would, however, be satisfied if each crew had a 200–250 miles run, and it would be quite practicable to work the engines through, with a change of men, though it is more probable that engines, as well as men, would be changed.

Improving Suburban Train Services.

REVISED train services became operative as from February 28 on the Manchester South Junction and Altrincham Railway. This line, which connects Manchester and Altrincham and intermediately serves important residential areas, is less than

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RAILWAY FACILITIES IN THE VICINITY OF MANCHESTER, SHOWING M.S.J. AND A. LINE.

nine miles long, and as there are nine stations, four in Manchester proper and five outside, it will be appreciated that on the basis of a previously existing dense train service there was difficulty in effecting improvements. By careful time-table revision, however, the authorities have been able to put into operation a quicker and more frequent service which should prove helpful in counteracting the keen competition of the tramway, which for a long way runs parallel with the railway. The daily service prior to February 28 consisted of 63 trains, while the new service requires 74. In the peak periods trains run at intervals averaging 6½ minutes, while in the slack times the interval between trains is approximately 25 minutes. Long trains are, of course, essential in the rush hours, but at other times short trains at much higher speeds are being run, an average improvement of 18 per cent. in time being claimed for the new service. Considerable ingenuity has been displayed in the revision, as there are complications by reason of the passage over this line of L.M.S. and C.L.C. trains, but by a careful allocation of train stops and semi-express workings, a new schedule has been devised that should prove beneficial to the travellers on this line and be of advantage as a means of stemming the encroaching competition of other transport agencies.

German Railway Developments.

MR. J. BASSETT-LOWKE points out that a reference to the introduction of third-class sleeping cars on German railways, in the January number, is somewhat misleading, in that such cars were in use in 1914, and that, soon after the War, trains were running between Berlin and Munich consisting only of first, second and third class sleeping cars. The third-class vehicles accommodated three passengers per compartment (presumably three each side), the second-class two and the first class one. He also mentions an installation of wireless telephony now in use on certain German trains, as to which he sends a description supplied by a friend as follows :—

"It is what is called the 'FD' train, due out of Berlin at 6.5 p.m. from the Lehrter Station, near the heart of the City, non-stop to Hamburg, 180 miles distant, where it is due to arrive at 9.35 p.m. The return train is even faster, leaving Hamburg at 7.44 a.m., and is due at Berlin at 11 a.m., also non-stop. The service is specially designed to enable a busy Hamburg shipowner to get to Berlin in time for business and lunch, to transact more business after lunch, and get back home the same night with very little fatigue. The train might be called the 'Limited' in the proper sense of the word, as it is quite short and compact, is first and second class only, and does not carry any unnecessary weight like most Continental long-distance trains seem to do.

"The engine is one of those huge, eight-coupled affairs—2-8-2—the railway people call it—with two great big flaps on either side of the smoke-box door, and looks for

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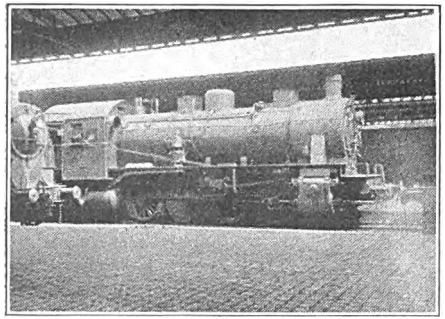
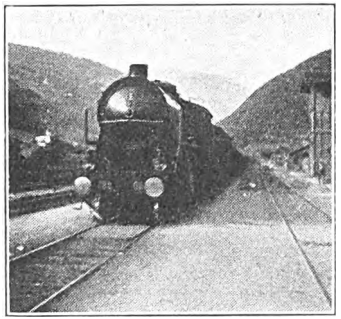
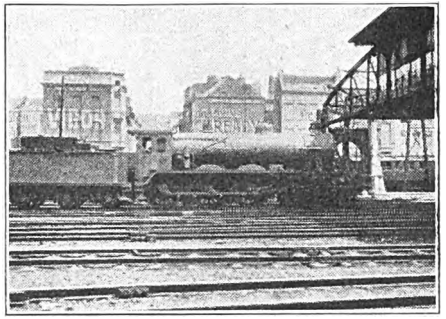


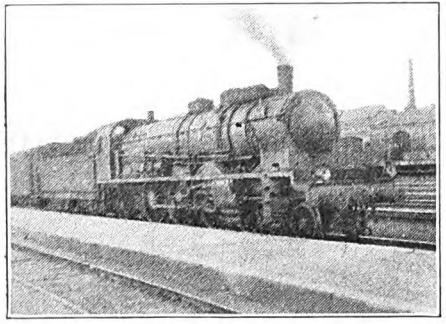
0-8-0 local passenger locomotive at Brussels, Belgian Railways.



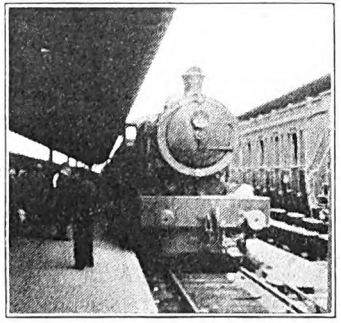
0-10-0 locomotive on goods descending incline from Brenner to Brifen (Bressanove). Italian State Railways.



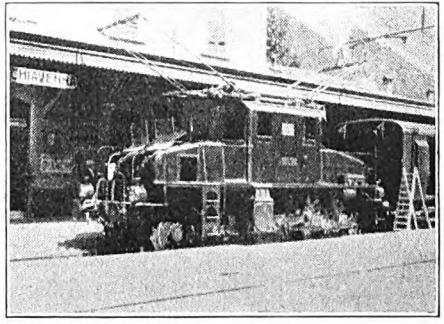
4-6-0 passenger locomotive in Brussels Station. Belgian Railways.



4-6-0 express passenger locomotive entering Karlsruhe. German Railways.



4-6-0 express passenger locomotive on Ostend-Brussels express entering Brussels Station. Belgian Railways.



Electric locomotive on Chiavenna-Colico (North Italy) branch. Italian State Railways.

SCENES ON CONTINENTAL RAILWAYS (Photos. by D. M. Minshall).

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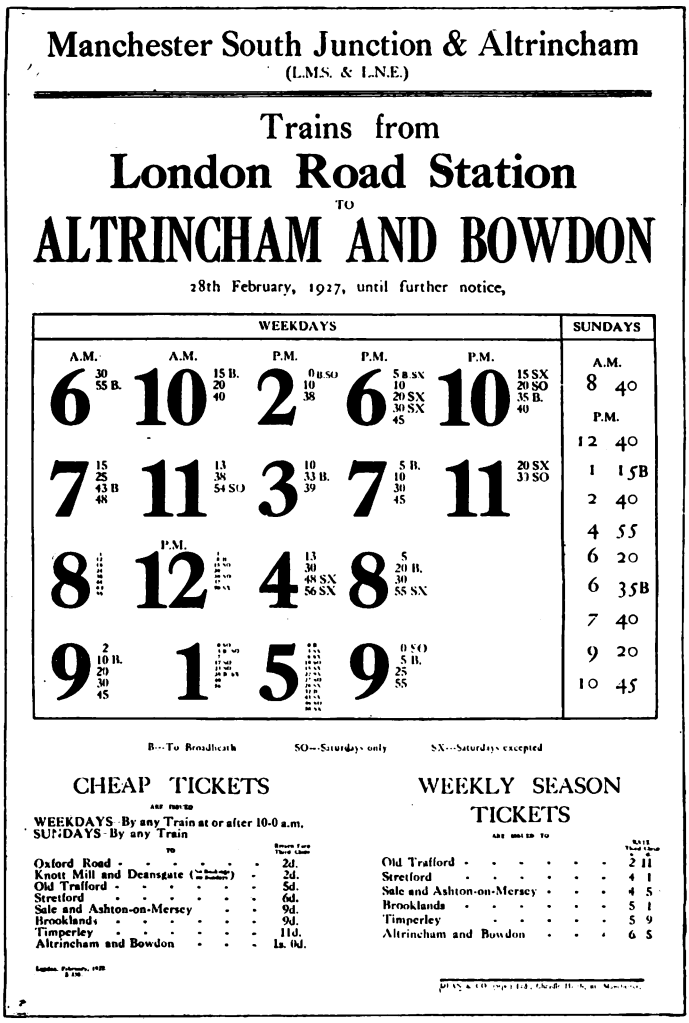
all the world like some antediluvian Mastodon rushing along with blinkers over its eyes to keep it from shying at things by the way. But, joking apart, ungainly as it may look, it can travel and haul, and if all the gadgets with which it seems loaded and studded do not make for beauty of outline, they no doubt serve some very useful purpose in economising on fuel and oil, or in raising that elusive figure of kilometre-tonnage per pound of coal burned, or whatever it is called, by another few decimal points or so. There is one traveller who is frequently on the Continent, and he always has a look at the engine before the train starts—that is, if he has got to the station in time—and then at the end of the journey he insists upon having another look, presumably to see that none of the gadgets have fallen off on the way.

"Well, to resume, in one of the coaches there is a well-padded compartment with the wireless telephone operator in possession, and an attendant. If you want to speak to your hotel at the other end, you ask the operator to get through. After a short interval the number comes on and you can then tell the hotel porter all about your requirements, whether you want a large or a small room, in front or in rear, and so on. Rear rooms, by the way, are very much in demand just now in Germany owing to the fearsome cacophony of sound produced by the German motor-horns that are at present so popular. All this is done while the train is going at full speed. Of course, it costs a little more than the ordinary trunk call, but the rates are not exorbitant. The distance is divided into five zones, and the further you are from Berlin, the more you have to pay to get through.

"The Berlin end of this run is unique in Continental practice, because on your arrival at the station in a taxi as usual, you walk no more than a few yards to the Booking Office, on the same level, and then a few more through a door, and you are on your platform, at your train, and probably at your coach, all on the same level, and not more than 100 ft. in all from the street. This is very different from the usual scramble upstairs and downstairs and long-distance walks through tunnels and along endless platforms."


Manchester South Junction & Altrincham
(L.M.S. & L.N.E.)

Trains from
London Road Station
TO
ALTRINCHAM AND BOWDON

28th February, 1927, until further notice,

WEEKDAYS

A.M. 6 30 55 B. | A.M. 10 15 B. 20 40 | P.M. 2 0 B SO 10 38 | P.M. 6 5 a.m. SX 10 20 SX 30 SX 45 | P.M. 10 15 SX 20 SO 35 B. 40

7 15 25 43 B 48 | 11 13 38 54 SO | 3 10 33 B. 39 | 7 5 B. 10 30 45 | 11 20 SX 35 SO

P.M. 8 | 12 | 4 13 30 48 SX 56 SX | 8 5 20 B. 30 55 SX

9 2 10 B. 20 30 45 | 1 | 5 | 9 0 SO 5 B. 25 55

SUNDAYS

A.M. 8 40

P.M. 12 40 | 1 15B | 2 40 | 4 55 | 6 20 | 6 35B | 7 40 | 9 20 | 10 45

B—To Broadheath SO—Saturdays only SX—Saturdays excepted

CHEAP TICKETS

WEEKDAYS—By any Train at or after 10-0 a.m.
SUNDAYS—By any Train

TO	Return Fare Third Class
Oxford Road	2d.
Knott Mill and Deansgate	2d.
Old Trafford	5d.
Stretford	6d.
Sale and Ashton-on-Mersey	9d.
Brooklands	9d.
Timperley	11d.
Altrincham and Bowdon	1s. 0d.

WEEKLY SEASON TICKETS

	Third Class
Old Trafford	2 11
Stretford	4 1
Sale and Ashton-on-Mersey	4 5
Brooklands	5 1
Timperley	5 9
Altrincham and Bowdon	6 5

POSTER ANNOUNCING NEW ALTRINCHAM SERVICES.

Group Booking on Railways.

MR. H. WRIGHT, of Penrith, suggests that the railways might with advantage adopt the group system of booking as an alternative or in addition to the special excursion arrangements. His scheme is thus explained :—

"The idea is to have the 'Group Offices' continuously acting as agencies for the formation of excursion parties at excursion rates. The parties would run as

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the groups completed themselves. They might be of 12 or 20 third-class, and 4 or 6 firsts, for any one destination, or round trip, whatsoever, in the United Kingdom, with possibilities even of extension abroad. The completed group would leave by a certified ordinary train and return ditto, or if for a round trip, say from London to Scotland, by West Coast route, and back by East, it would have to be completed in a given time. In booking for a group, the public might be asked for a 10 per cent. deposit. Roadside station bookers might be 'grouped' from the nearest 'town' station, with a free pass to it on the 'appointed day,' which day the station master would duly notify to the 'groupers' by postcard. Some such plan as this, worked out in full detail, would mean a real attack on road traffic, once more get the iron way into full use, and give the overworked roads a rest pedestrians would appreciate!

"The first-class groups might be expected to attract private party motor tourists contemplating a week's round in their own or a hired car. Char-à-banc trip organisers, and, indeed, all excursionist agencies, would closely scrutinise rail *versus* road prices to see where economy and profit lay. It may be objected that the above plan would reduce ordinary fare travel. This, however, is not likely. The business man, the urgent traveller, and the wealthy, would not, or could not, wait for groups. Against any possible loss in this respect there would be ample insurance in the enormous impetus given to the public to 'excursionists.' Little Pedlingham would be able to study continuously on its station walls announcements of groups in formation. Better still, it would be able to submit to its station master groups of its own ideals of where to spend a happy day or week. Indeed, the possibility of travel, at all, might enter many minds for the first time. Group excursion parties might become as popular as whist drives and dances!"

This suggestion has been submitted to one of the leading railway companies, and in regard thereto the following comment has been made:—

"Mr. Wright does not suggest anything which is unknown or not in mind to our canvassers and passenger managers. The idea of getting together parties of travellers is at present very widely cultivated, particularly in country districts. There are special rates for parties of 30, and even for groups of 12. The only new item which Mr. Wright mentions is the exhibition of lists or posters at the railway stations, but this is covered by savings associations in industrial districts which issue cards for weekly payments, and public-house and parish-hall lists, which are probably better than the exhibition of sheets at the stations which would quickly become defaced. Apart from the departments which are actively catering for this kind of thing, tourist agents in various towns, and also large shops and clubs take up the group idea very actively."

Metropolitan Railway Athletic Association Concert at Queen's Hall.

ON Friday, February 25 last, Lord Aberconway, P.C., Chairman of the Metropolitan Railway Company, presided at the fifth annual Bohemian concert of the Metropolitan Railway Athletic Association, when the Queen's Hall was filled to capacity with an appreciative audience. Arrangements were under the direction of the Concert Committee of the Association, of which Mr. T. Wilding is Chairman, Mr. Sidney Brown hon. musical director, and Mr. W. R. Squire hon. secretary.

Among those supporting Lord Aberconway or present as guests were the following:—

Directors, Metropolitan Railway: Sir Clarendon Hyde, Sir Edward Manville and Mr. R. H. Selbie (Director and General Manager).

Chief and other Officers, Metropolitan Railway: Messrs. H. S. Stewart, E. A. Wilson, P. R. Boulton, W. Holt, W. M. Ballingall, E. Sutton, G. Hally and C. W. Clark; also Mr. A. B. Garside and Mr. C. Jones, retired officers, together with Sir Albert Wyon, one of the auditors to the company.

Visitors: G.W.R.—Messrs. F. Potter, E. Robinson, R. Cope, C. R. Dashwood, Broad, J. D. Aikman, and Glaizer. L.N.E.R.—Messrs. C. J. Brown, G. Marshall and A. White. Southern—G. Ellson and W. Challis. "Underground"—Mr. C. S. Louch. R.C.H.—Messrs. P. H. Price and A. Painter. Westinghouse Brake & Saxby Signal Co. Ltd.—Messrs. Proud, Royal and Griffiths. General Electric Co. Ltd.—Mr. Maddams.

The London Traffic Problem.

THE problems of the South-Eastern Area are discussed in the third Report on London Traffic, which was issued on March 2 through the Ministry of Transport. Evidence given before the Committee dealt mainly with the closing of certain railway stations, the overcrowding on railways and street vehicles, and the need for the provision of tube railways. With regard to the nine stations closed by the Southern Railway, the Committee agree that in the circumstances the action of the company was warranted, but suggest that further consideration should be given to the case of Old Kent Road. The Committee refer, in appreciative terms, to electrification developments on the Southern, stating they are satisfied that the company are making a notable effort to provide all the facilities

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which are reasonably necessary for the travelling public. In carrying out their programme of electrification the company have certainly shown initiative and a regard for the public convenience. On the question of tubes, it is stated that as the Southern Railway intend to provide all the facilities which are reasonably necessary for the travelling public, they consider that the further examination of proposals for additional tubes should be deferred until the railway company have been given a reasonable opportunity of completing their programme. In their previous reports dealing with North and North-East London and East London the Committee expressed the opinion that some scheme for bringing all forms of passenger transport under unified control appeared to offer the only satisfactory and lasting solution of the whole problem of passenger transport in London.

High Railway Speeds in Canada.

In a recent issue a question was raised by a correspondent as to which part of the British Empire, outside the British Isles, could boast the highest scheduled railway speeds. A timely letter on the subject, which we have received from a Canadian reader—Mr. E. S. M. Macnab, of Montreal—appears to indicate that Canada can, without much difficulty, boast the distinction. Recent accelerations over the main line of the Canadian Pacific Railway, between Montreal and Toronto (where direct competition exists with the Canadian National Railways), have resulted in the institution of some very fast schedules. Train No. 37, known as *The Canadian*, is booked to run the 126·7 miles from the Westmount station at Montreal to Smith's Falls in 135 min., including a conditional stop at Bedell; train No. 38—*The Rideau*—in the opposite direction, runs the 124 miles from Smith's Falls to Montreal West in the fine time of 127 min., at 58·6 m.p.h. average speed, also including the conditional Bedell stop. These trains are, however, of unusually moderate weight, consisting generally of only four 12-wheeled cars, weighing empty about 230 English tons. For hard work, however, trains Nos. 37 and 38 are beaten by trains Nos. 19 and 20, allowed 148 and 141 min. respectively for the Montreal West and Smith's Fall run, inclusive of 3 min. standing at Bedell and conditional stops at St. Anne's and St. Clet. This train, known as *The Canadian*, in each direction carries a minimum load of eight all-steel cars, weighing empty 540 English tons, and time is kept with as many as 11 cars, of 800 tons total weight. The *Dominion Overseas*, running at night from Montreal to Chicago (train No. 21 outward and 22 return), carries a rostered load of 11 cars, 66 axles, taring 850 tons. In this case 159 min. are allowed for the run of 124 miles from Westmount to Smith's Falls, nominally non-stop, though a stop for water is always needed intermediately. The engines which work these trains are of the "G.1" 4-6-2 type, "2200" series, having cylinders 22½ by 28 in. and 6-ft. 3-in. driving wheels, 63½ tons on driving wheels and a total engine weight of 99½ tons. This class of engine, however, is about to be replaced by 24 engines of the "G.3" 4-6-2 type, which have been specially assigned to the working of trains Nos. 19, 20, 21, and 22. In these the cylinders are increased in size to 24½ by 30 in., and the working pressure is raised to 250 lb. per square inch. The "G.1" series, nevertheless, has done excellent work from both the speed and haulage standpoints; double-heading is rarely resorted to save in very cold weather and during heavy snowfalls. The road traversed between Montreal and Toronto is for the most part level and free from bad curves.

A Trip on a Canadian "Flyer."

With his letter our correspondent sends a couple of logs detailing the work of the two fastest trains—the westbound *Canadian* and the eastbound *Rideau*. In view of the interest of this comparison between the best Canadian and British locomotive performance, we give the eastbound log in full herewith:—

C.P.R. Smith's Falls to Montreal.

Train No. 38, *The Rideau*.

Engine: 4-6-2 No. 2226.

Load: 24 axles, 227 tons tare, 240 tons full.

Distance. Miles.		Schedule. Min.	Actual. Min.	sec.
0·0	Smith's Falls ..	0	0	00
9·1	Merrickville ..	11	12	30
20·8	Bedell (*stop*) ..	23	23	00
			23	30
28·1	Mountain ..	30	32	10
36·1	Winchester ..	38	38	30
42·0	Chesterville ..	44	43	40
49·7	Finch	52	49	40
55·8	Avonmore ..	58	55	50
60·6	Monklands ..	63	60	30
66·0	Apple Hill ..	68	65	00
74·7	Green Valley ..	77	72	45
82·3	Dalhousie Mills ..	85	80	00
88·5	De Beaujeu ..	91	85	00
94·3	St. Clet	97	91	05
100·3	St. Lazare ..	103	97	10
105·0	Vaudreuil ..	108	101	30
108·3	St. Anne's (*stop*)	111	104	55
			105	00
113·7	Beaconsfield ..	116	111	00
119·1	Dorval	121	116	00
124·0	Montreal West ..	127	121	15

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"This remarkable run followed a late start of 5 min. from Smith's Falls, and it will be seen that the lateness was more than recouped, in spite of a conditional stop at Bedell and a special unscheduled stop at St. Anne's. The astonishingly rapid starts from rest, so common in America—as mentioned in a recent article by Mr. Humphrey Baker—are witnessed to by the times of 8 min. 40 sec. over the 7·3 miles from Bedell to Mountain, and 6 min. for the 5·2 miles from St. Anne's to Beaconsfield. In regard to high speed, notable times were 17½ min. for the 21·6 miles from Mountain to Finch, and 24½ min. for the 27·9 miles from Monklands to De Beaujeu. Most noteworthy, perhaps, was the completion of the start-to-stop journey of 77·5 miles from Bedell to St. Anne's in 71 min. 25 sec.—a striking parallel to the similarly loaded 77·3 miles' run of the 3.45 p.m. from Swindon to Paddington, on our Great Western Railway—and to cover 124 miles in 121 min., with *two* intermediate stops, is an achievement of which Canadians may well be proud."

Comparisons of British and American Railways.

REFERRING to the "Pertinent Paragraph" under this heading published on page 398 of the November number, Mr. James V. Porter, an engineman on the Minneapolis, St. Paul and Sault-Ste. Marie Railway, suggests that, although Mr. St. John Ervine may claim to know the railways of both countries, he "has a lot yet to learn on American railways, particularly on the ability of the American locomotive engine drivers." "So much so, in fact," continues Mr. Porter, "that for the information of the readers of your esteemed magazine, I feel it my duty to challenge his statement, to wit: 'There is not one engine-driver in America who is fit to serve as an oiler and greaser to a British engine-driver. And that's not extravagant boost, it is a plain statement of plain fact.'" Mr. Porter elaborates his argument, as to which he may be allowed to speak for himself, as follows:—

"This gentleman's first complaint is that on his first railway journey in America, that the engine driver was so clumsy that he was unable to start his train without throwing the whole of the gentleman's dinner on his lap. Very annoying, I admit, but Mr. Ervine, I am afraid, was rather hasty in his conclusions, as it was not all the fault of the clumsy driver. If Mr. Ervine had taken more pains in his investigation, what he would have found is probably this:—American trains are not fitted with side buffers and coupling hooks with all the slack taken out of them after they are coupled, making a slackless train, like the English trains; instead, they are equipped with an automatic coupler and a central buffer, which is more of a chafing-block than a buffer. So on a long passenger train there is considerable slack. Still, at the same time, this slack is a useful thing, though very annoying at times, for it enables an overloaded engine to start a train by slacking, *i.e.*, taking up the slack by backing up a trifle, that otherwise would be an impossibility to start without assistance from another engine if equipped like an English train. It was during this slacking operation that the dinner landed in our friend's lap. Now, this driver had to start his train, and if the engine would not start the train on the slack of the head cars the driver had to take more; the more slack he took the harsher the start. Under these conditions a driver is obliged to jerk his train more or less to start it, though, no doubt, the engine was amply powerful enough to start the train without slacking at other portions of the road.

"Now as to the ability of an American engine driver to serve as a greaser to an English engine driver (as it happens a driver always greases or oils his own engine) perhaps not, but just the same the American driver must be bright enough to handle a locomotive equipped with a steam fireman, booster, feed-water heater, complicated air and electric equipment, a locomotive that is capable of hauling a train of anywhere from 80 to 150 forty foot 40-ton cars with a tonnage that will go from 3,000 to as high as 16,000 tons in one train. Now these clumsy drivers manage to keep these mile-long trains moving up hill and down dale with very few break in twos, and to do this means that you have to have more than a speaking acquaintance with the Westinghouse air brake. Above all, they do this so efficiently that the American railways can afford to pay their drivers over twice as much as the English, and at the same time charge only a trifle more for transportation, and some commodities even less. In passenger service they also manage to handle as high as thirty 70-ton Pullman sleepers in one train, and very, yes very, seldom does the dinner fly into the laps of the passengers, and then nine times out of ten it is caused by things not under the control of the driver. I rather think that drivers capable of such performance day after day would some how manage to grease an English engine if they had to.

"As regards Mr. Ervine's criticism of American sleepers, to English standards the criticism is no doubt warranted, but if Mr. Ervine had taken a drawing room, there being one in every Pullman standard

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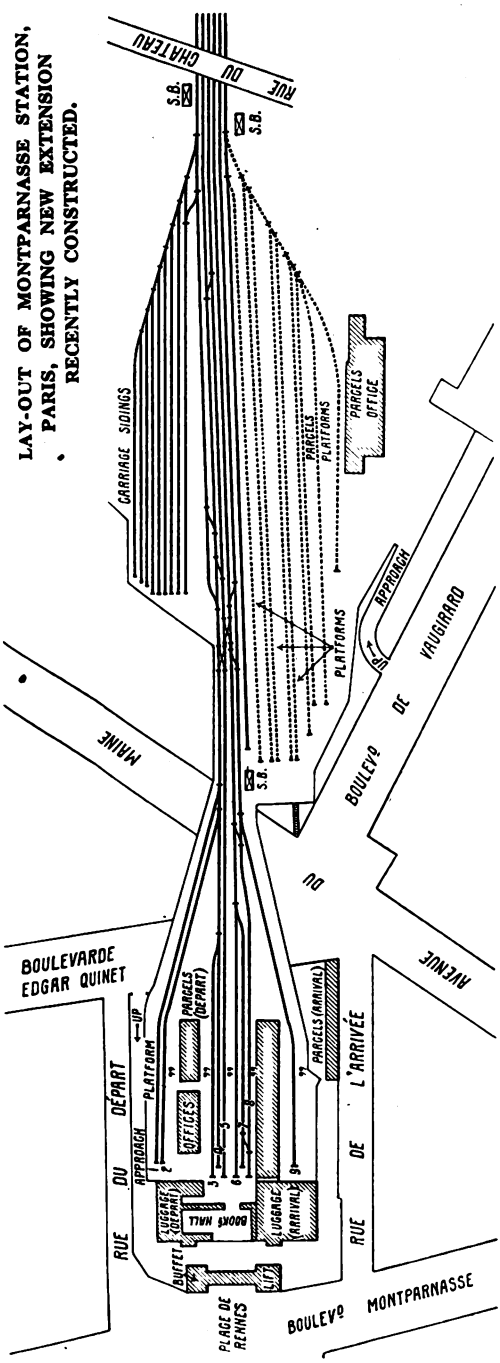
sleeper, he would have found the same privacy as would have been obtained on the L.M.S., or he could have gone one better and have taken a compartment sleeper and he would have then had his own individual lavatory. Even in the western part of the U.S., dozens of trains operate daily whose equipment consists of Pullman stock, with parlour observation and club lounging cars, also with a ladies' boudoir, with maid service, bath and shower, for the male passengers, barber shop and valet service, with a library for the use of all.

"The writer is British by birth, also an engine driver of 20 years' experience, on every class of service from the humble shunter to the stately expresses and has ridden behind the G.W.R. 'Castles,' and has talked 'shop' with express drivers of the L.N.E.R., Southern, and G.W.R. Railways. Even some of these gentlemen make a poor stop once in a while, even knocking down the buffer stops. And even the driver of the fast Calais-Paris rapide had to make two attempts before he had his splendid Pacific 'spotted' for water at the Abbeville water crane. In conclusion, I will take off my hat to the enginemen of England and France, and acknowledge that they are masters of craft, but to give the devil his due and in a spirit of fair play, wish to say that the great majority of U.S. enginemen are fully capable of oiling around any British locomotive, notwithstanding Mr. Ervine's accusations."

LAY-OUT OF MONTPARNASSE STATION, PARIS, SHOWING NEW EXTENSION RECENTLY CONSTRUCTED.



Extension of Montparnasse Station, Paris.

ONE of the oldest Paris stations is the Gare Montparnasse (High Level), of the Chemins de Fer de l'Etat, which serves, by main lines, southern Brittany, La Rochelle and Bordeaux, and, by suburban lines, the heavily populated districts out to Versailles.

Before the war it was found that owing to the numbers of passengers increasing rapidly an extension of some description was necessary, but with war intervening the alterations were left in abeyance. After the cessation of hostilities the need became even more apparent, the movement of passengers having still increased apace as the following figures, published by *L'illustration*, will show :—

	Suburban Lines.	
Year.	Departures.	Arrivals.
1901	2,231,000	2,234,000
1913	3,578,000	3,515,000
1925	5,709,000	5,725,000
	Main Lines.	
	Departures.	Arrivals.
1901	1,013,263	1,013,388
1913	1,344,676	1,344,100
1925	1,958,127	1,958,126

The original scheme, with the higher costs prevailing, proved to be impracticable, but in view of the urgent necessity for augmenting the facilities of handling passenger traffic a plan was approved for an extension at a cost within reasonable bounds, which would leave ample room for more elaborate changes when conditions might warrant.

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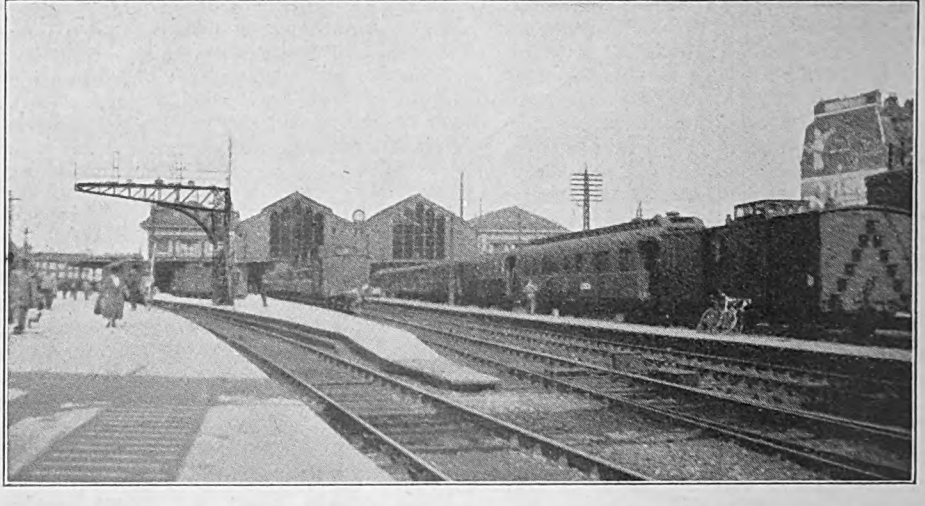
EXTERIOR OF MONTPARNASSE STATION, PARIS.

As will be seen from the diagram, six new platform lines have been constructed which are used for main-line arrivals with extra parcels sidings in addition, these being in the place of locomotive and repair sheds which have been transferred to Montrouge, a little distance farther out. The old platform lengths varied from 213 yards to 273 yards; the new ones are of 323, 361, and 415 yards.

Developments on New Zealand Railways.

We are indebted to Mr. N. Blake, of Auckland, New Zealand, for the following notes as to developments on New Zealand railways:—

"Recently the railway department has introduced a new type of sleeping car of a luxurious type. It is fitted with electric fans, hot water for washing, improved electric lighting, larger and more comfortable



PLATFORMS OF MONTPARNASSE STATION, PARIS.

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beds, and steel disc wheels. By way of demonstrating the smooth running of the new model sleeper a glass was filled with water on leaving the terminus on the trial trip, and not a drop was spilt during the 400-mile journey. Bearing in mind our severe curves, terrific gradients, and wild country traversed this feat can hardly be classed with a similar test on the English railways, where it would probably be accounted as nothing out of the ordinary. Another innovation is the decision that all passenger rolling-stock is in future to be painted 'Midland lake' as it passes through the shops. The locomotives as they pass through workshops are having their buffer beams painted bright red, and with red lining on cab sides instead of the old yellow. These changes are very welcome and a tribute to the English railway methods, which are evidently considered superior to the American notions, which are so prevalent in this country.

"Still another innovation is the introduction of a magazine called the *New Zealand Railways Magazine*, copies of which will probably have been reviewed in the pages of THE RAILWAY MAGAZINE by now. The paper is well produced, and printed in bold type on first-class art paper. A copy is supplied monthly gratis to every member of the staff, otherwise the price is 6d. per copy.

"Owing to the unfair motor competition, the rail motor in several types is being tested out on branch lines with a view to abolishing the slow mixed train and recovering the lost passenger traffic. The construction of concrete roads out of the large towns is very likely to make the position more acute in future. A Clayton railway steam car, a Sentinel Cammell, petrol 'Ford' converted rail cars, and the Edison electric storage-battery type have all been given a trial. The last-named type shows great promise, and on trial runs has more than justified the expectations of the department.

Speeding up of Expresses.

"Since the speeding up of the Auckland-Wellington express trains and the introduction of the 'Limiteds,' the latest A.B. 'Pacific' locomotives have been called upon to perform some high-speed running. The first newspaper special in New Zealand, chartered by the *New Zealand Herald* people to convey their papers to Hamilton, now leaves Auckland at 3 a.m. every morning. It is a decided innovation for the New Zealand Railways, and has aroused much favourable comment, as the daily paper is now able to be delivered in many inland towns before breakfast.

"As it is hoped to have the line doubled for at least 20 miles out of Auckland in a few years hence, a certain amount of single-line working and consequent unavoidable delays to trains waiting at crossing stations will be obviated. The photographs sent (not reproduced) will give some idea of the

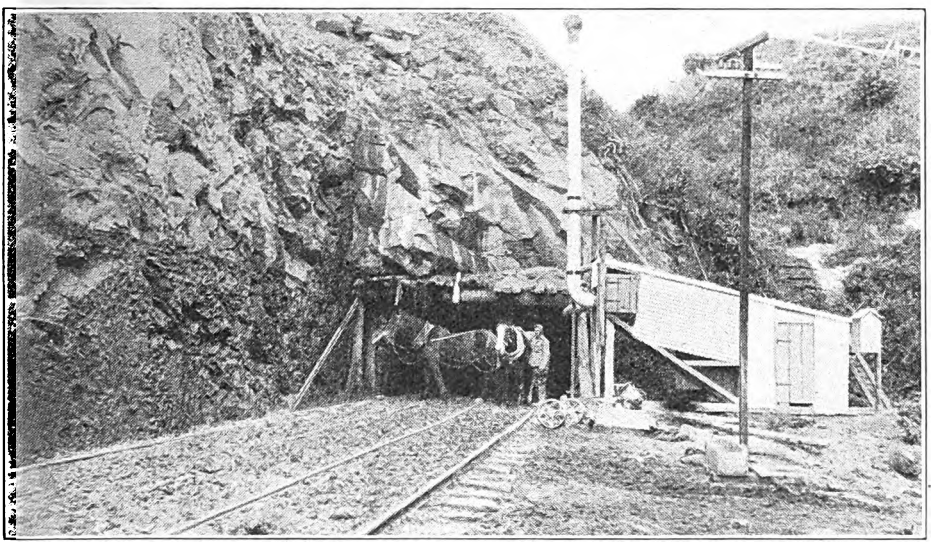

Photo.] [*N. Blake.*

TUNNEL CONSTRUCTION ON THE AUCKLAND-WESTFIELD LINE, NEW ZEALAND.

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size of the new deviation line along the harbour front and the new station terminus being built in Auckland. The present main line out of Auckland has a grade of 1 in 40 for 3 miles, and an equally trying gradient for 2 miles approaching the suburbs in the reverse direction. The new deviation will possess a ruling gradient of 1 in 132, which is considered a very easy grade indeed by New Zealand enginemen after what they are accustomed to on other parts of the system. It is interesting to note that every locomotive has a minimum of six wheels coupled, while some types have four pairs coupled. All are to the 3 ft. 6 in. gauge, have outside cylinders, and comparatively small driving wheels varying from 3 ft. 6 in. to 4 ft. 6 in. diameter for the 'Pacific' type latest express locomotives. Some time ago a suggestion to build express engines with 5 ft. 6 in. wheels was made, but, owing to the terrific mountain grades and increasing train loads, combined with the very low point at which the large boiler must be pitched to clear tunnel limits, the suggestion has not been entertained by the locomotive department.

despatched. Considering the small population of New Zealand as only 1¼ million inhabitants, the traffic is very creditable. The goods marshalling yard, lines to wharves and quays, and the goods sheds are being arranged with ample space for future developments and in accordance with the latest practice.

"Regarding the passenger portion of the station, the platforms will be 16 ft. above ground level, ramps and stairs providing access from one level to another. The motor-car parking area will be three-quarters of an acre in extent, while tram and vehicle traffic will run one way only, thus avoiding con-

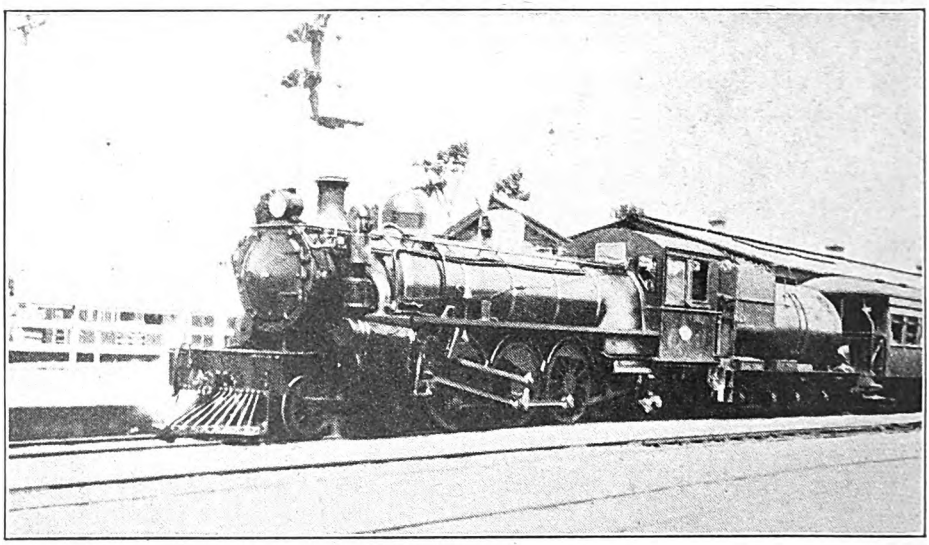

Photo.] [*J. Kemp.*

NEW ZEALAND GOVERNMENT RAILWAYS.

Class AB 2-cylinder 4-6-2 locomotive on train to Auckland, at Marton Junction.

New Station at Auckland.

"The new station at Auckland is to be of very modern design. For the year ended March 31 last no fewer than 35,000 ordinary trains travelled in and out of Auckland, in addition to which 3,880 special trains were

fusion. The station itself will be of the run-through type and trains will run through if necessary. No luggage trucks will be used on the platforms, but the luggage would be taken in at the basement level and transferred through passages to the platforms and raised by lifts. The main booking hall will be 54 ft. by 40 ft. and, instead of the usual pigeon holes for the sale of railway tickets to travellers, spacious counters with brass grill partitions will be utilised. Provision is also made for fine modern dining rooms and a hair-dressing saloon for the convenience of passengers. All platforms and the concourse between them will be covered over. A centre locomotive run-round road will be provided between platform roads to enable engines to reverse where necessary."

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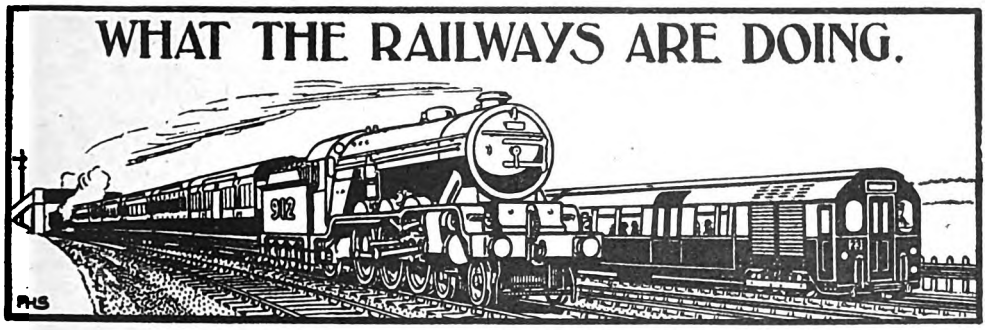
WHAT THE RAILWAYS ARE DOING.



L.M.S.R. Appointments.

The following appointments have been sanctioned by the Directors :—

Secretary's Department.

Mr. H. Cox, to be Assistant to Chief Cashier, Euston.

Vice-President's Departments.

Mr. H. J. Moore, to be Personal Assistant to Vice-President for Works and Ancillary Undertakings, Euston.

Mr. J. M. Medcraft, to be Personal Assistant to Vice-President for Railway Traffic Operating and Commercial Section, Euston.

Mr. G. S. Hussey, to be Personal Assistant to Vice-President for Accounting and Service Department, Euston.

Mr. E. B. Hassall, to be Personal Assistant to Vice-President, Railway Traffic Operating and Commercial Section, Euston.

Chief General Superintendent's Department.

Mr. A. C. F. Calladine, to be Assistant, Passenger Services, C.G.S.O., Derby.

Mr. G. M. Chambers, to be Assistant Divisional Controller (Freight Services), C.G.S.O., Derby.

Chief Goods Manager's Office.

Mr. R. Jones, to be Goods Agent, Soho.

Mr. F. McDowell, to be Irish Traffic Manager, Dublin, vice Mr. A. T. Cotton.

Mr. R. D. Roberts, to succeed Mr. F. McDowell as Assistant Irish Traffic Manager, Dublin.

* * *

Also the following further series :

Chief General Superintendent's Department.

Mr. W. Miller to succeed Mr. Sutcliffe (retired) as Stationmaster, Blackpool Central.

Mr. C. E. Fry to succeed Mr. Kilner (retired) as Passenger Agent, Huddersfield.

Mr. B. Millington appointed Passenger Agent, Oldham, vice Mr. Fry.

Mr. H. Austin to be District Loco. Superintendent, Toton, vice Mr. Kemp, retired.

Mr. R. F. Harvey to succeed Mr. Austin as District Loco. Superintendent, Rugby.

Mr. G. A. Frost to succeed Mr. Harvey as District Loco. Superintendent, Burton.

Mr. W. H. Ensor appointed District Loco. Superintendent, Chester, vice Mr. Frost.

Mr. E. M. Amber to succeed Mr. Power (resigned) as District Loco. Superintendent, Abergavenny.

Mr. A. W. Hamer appointed Assistant Divisional Controller, Passenger Services, Crewe.

Mr. J. Dixon, Maryport, to be District Controller, Workington.

Mr. L. J. Cook appointed District Controller, Skipton.

Mr. A. P. Hunter appointed District Controller, Bedford.

Chief Goods Manager's Department.

Mr. M. O. Partington to be L.M.S. Goods Agent at Swansea (Victoria and St. Thomas).

Mr. L. Orr appointed Goods Agent, Preston, vice Mr. Hales, retired.

Chief Mechanical Engineer's Department.

Mr. H. Chambers, Chief Draughtsman, Derby, appointed Technical Assistant also.

Carriage and Wagon Department.

Mr. E. Merrett to be Works Superintendent, Newton Heath.

Mr. W. G. Smalley to be Works Superintendent, Earlestown.

Mr. W. J. Smith to be Works Superintendent, Derby.

Mr. W. Anthony appointed Works Manager, Newton Heath.

Mr. E. Pugson appointed Works Manager, Derby.

* * *

Mr. Frederick McDowell, who has been appointed Irish Traffic Manager, London Midland and Scottish Railway, Dublin, as

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from January 1, 1927, entered Great Northern Railway (Ireland) service at Belfast in 1897, and after five years' experience at various stations on that company's system, joined the London and North Western Railway at Liverpool in September, 1902, serving at a number of stations in that district. Mr. McDowell was subsequently transferred to the Manchester district, and was in charge of Stockport and Leigh and Bedford goods stations, besides obtaining experience in the District Goods Manager's office. Early in 1920 Mr. McDowell was appointed to the Chief Goods Manager's Staff at Euston, and was subsequently transferred to Dublin as outdoor assistant to the Irish Traffic Manager. In September, 1925, he was appointed Acting Irish Traffic Manager, Dublin, and since that date has had charge of London Midland and Scottish interests in the Irish Free State.

Lafayette] [*Dublin.*

MR. F. McDOWELL,

Appointed Irish Traffic Manager, Dublin, L.M.S.R.

* * *

MR. R. D. ROBERTS, who has been appointed Assistant Irish Traffic Manager, London Midland and Scottish Railway, entered London and North Western service at Holyhead in December, 1899, and completed his training on the Dundalk, Newry and Greenore Railway. He was transferred to the Liverpool district in January, 1906. In April, 1909, he was appointed outdoor clerk to the District Goods Manager, Leeds, being temporarily lent for four successive summer seasons to the Rolling Stock Superintendent at Stafford for special work in connection with the distribution of fruit vehicles. Mr. Roberts was appointed Goods Agent, Stafford, in July, 1913; Goods Agent, Shrewsbury, February, 1915; and in March, 1916, was lent for special duties to the Ministry of Munitions, London. In September, 1917, he returned to the London and North Western Railway as outdoor assistant to the Outdoor Goods Manager, Euston, and following upon the amalgamation of railways, was transferred in January, 1922, to the staff of the General Superintendent, Manchester (Western Division) as head of section, Goods Station Working Department, being re-transferred to Euston in March, 1924, as chief clerk (goods station working) to the Goods Operating Manager of the London Midland and Scottish Railway. Mr. Roberts returned to Ireland as Operating Assistant to the Irish Traffic Manager, Dublin, on September 1, 1925.

Lafayette] [*Dublin.*

MR. R. D. ROBERTS,

Appointed Assistant Irish Traffic Manager, Dublin, L.M.S.R.

* * *

MR. E. A. LANE, who is retiring from the position of General Secretary of the Railway Benevolent Institution at the end of April, owing to ill-health, succeeded Mr. A. E. Mills in January, 1925. Mr. Lane entered the service of the Institution in September, 1880, at the age of 15 years, as junior clerk,

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became Secretary's Chief Assistant in November, 1900, and was appointed Assistant Secretary in July, 1906. In 1918, when H.R.H. the Prince of Wales was President of the Institution, he was largely responsible for the arrangements for the very successful Flag Day collection throughout the service, which resulted in a net addition of £31,054 to the funds, the expenses being about 6 per cent. only.

* * *

MR. HERBERT CHARLES WALTON, of the staff of the Railway Clearing House, and for some years past Secretary of the Railway Accountants' Committee, has been appointed to the Secretaryship of the Railway Benevolent Institution, in the place of Mr. E. A. Lane, who is retiring on account of ill-health. Mr. Walton's appointment will take effect as from May 1.

* * *

MR. CHARLES HERBERT THOMPSON, formerly Chief Clerk, has been appointed Assistant Secretary of the Railway Benevolent Institution.

* * *

CONSEQUENT upon the retirement of Mr. J. Williams, Joint Superintendent, Shrewsbury, the L.M.S. and G.W. Joint Committee has appointed Mr. J. Radcliff as his successor.

* * *

MR. J. RATCLIFF, who has been appointed Joint Superintendent, Shrewsbury, London Midland & Scottish and Great Western Joint Committee, was born in 1867. He entered railway service in 1883, as a porter at Craven Arms, and obtained wide experience in subsequent years, as follows: signalman, Ashford Crossing, March, 1880; signalman, Moreton-on-Lugg, December, 1891; signalman, Dinmore, January, 1893; foreman, Port Sunlight, December, 1893; station master, Mickle Trafford, January, 1895; station master, Thurstaston, January, 1896; station master, Hadlow Road, January, 1897; and inspector, Birkenhead Extension, October, 1898. In November, 1905, he became night station master at Chester, being appointed assistant station master in January, 1908, and station master in January, 1910. His appointment to succeed Mr. Williams as Superintendent dates from January 1, 1927.

* * *

THE Minister of Transport has recently made the following Order:—The London Midland and Scottish Railway (Burton and Ashby Light Railway Abandonment) Order, 1927, authorising the abandonment of the light railways constructed by the Midland Railway Company under the Burton and Ashby Light Railway Order, 1903, and the Burton and Ashby Light Railway (Amendment) Order, 1906.

* * *

THERE are 64 escalators running at 30 "Underground" stations, and when the present escalator scheme is completed, this number will be increased to 85 machines operating at 34 stations. Some stations, Tottenham Court Road, for example, have five separate machines. The new station at Piccadilly Circus will have no fewer than 11 escalators—a record for any one station in the world. These escalators will have to handle an annual traffic of 50 million passengers. Five escalators are in commission at Charing Cross, and the complete scheme provides for a total of eight, when it will be possible to get from the Bakerloo and Hampstead platforms direct to the street level without the negotiation of any fixed stairs. Other escalator schemes are in hand for Waterloo, Highgate, Camden Town, and Sloane Square stations. Those at Waterloo will be ready for use by Easter.

* * *

DURING February an interesting experiment was in operation in connection with the running of the Scotch Pullman express between Harrogate and King's Cross. For this non-stop run a Great Central "Director" class 4-4-0 two-cylinder locomotive, No. 5511, *Marne*, was tried with considerable success, working up one day and down on the corresponding train. The trains in question are worked normally by Great Northern "Atlantic" locomotives, and occasionally four-cylinder, six-coupled Great Central engines have been employed thereon. On the first occasion of the 4-4-0 coming up, time was kept on the throughout run in spite of delays amounting to eight minutes, the load behind the tender being about 280 tons.

* * *

IMPORTANT structural alterations are now being made at Finsbury Park ("Piccadilly" Line) station. The old "hole in the wall" booking offices are to be cleared away and the passimeter system introduced. This improvement will alleviate considerably the congestion which now occurs during the rush hours, and the rapid ticket-issuing apparatus to be employed will speed passengers to the trains. The "Underground" have made several experiments recently in the direction of floodlighting of stations, and a further experiment of this kind is to be made at the reconstructed Finsbury Park station by substituting for the usual rows of

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subway lights a scheme of powerful—though diffused—floodlights.

* * *

In order to keep pace with increasing traffic requirements, the Metropolitan Railway have found it necessary to install in their power station at Neasden an additional power unit rated at 25,000 h.p. The new unit comprises an impulse-type turbine running at 2,000 r.p.m., and is driven by steam superheated to 700° Fahr., with a pressure of 265 lb. to the square inch. The increased capacity of the power station has also called for enlargement of the water-cooling plant, and this has been overcome by providing a spray installation spread over a 2½-acre lake with a cooling capacity of 1,000,000 gallons per hour.

* * *

On Wednesday, Thursday, Friday and Saturday, March 2, 3, 4 and 5, the Dramatic Section of the T.O.T. Philharmonic Society gave highly appreciated performances of the Gilbert and Sullivan opera "Ruddigore" at the Scala Theatre. Every seat was booked for all performances, and although everyone concerned was in "Underground" employ, or associated therewith, the performances throughout reached a level closely approximating to professional standards. The leading characters were taken by—

Ladies.—Doreen Howard, Queenie Thomas, Dorothy Riley, Edith Griffiths and Nan Lloyd.

Gentlemen.—Alec Pleasance, Thomas Dean, John Priestly, George Nicoll and James Tolman.

Mr. Emil Hardy was, as usual, Producer and Stage Manager, while Mr. Charles Lambert again acted as Musical Director. The Assistant Stage Manager was Mr. E. G. Le Pelley, and the Accompanist at Rehearsals Mr. George Murlis. Mr. H. W. Blunden was in charge of ticket arrangements as usual. This was the thirteenth production of the Dramatic Section of the T.O.T. Philharmonic Society. It began in 1921, and, judging by the appreciation shown and the number of encore items which had to be interpreted, this latest performance was as popular as any which had gone before. The Society has "The Rebel Maid" in rehearsal for performance in October next.

T.O.T. PHILHARMONIC SOCIETY'S PERFORMANCE OF "RUDDIGORE."

In view of the growing number of motor-cars which the Southern Railway is called on to transport between Portsmouth and the Isle of Wight, the company have placed an order with Wm. Denny & Bros. Ltd., of Dumbarton, for a new self-propelled ferry vessel solely for this service, which it is hoped will be available in time to participate in the summer traffic this year.

* * *

Major Hall's report on the derailment, near Waterloo Junction, of the 1.15 p.m. train from Charing Cross to Ramsgate on October 13 last, has been issued. The train was drawn by 4-4-0 No. 756A. The report is mainly concerned with a critical consideration of the signalling and of the action of signalmen and others concerned, and is

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accompanied by a detailed plan. The derailment is attributed to the fact that a contact in the electrical signalling system had become reversed. When the new signalling was installed, the locking concerned was found to be entirely in order, so that the reversal seems to have occurred in the course of repair or replacement, a matter which is gone into at considerable length and in close detail.

* * *

THE railway companies have agreed to a 25 per cent. reduction in the fares for advertised circular tours, first and third class, in England, Wales and Scotland, the tickets to be available for two calendar months, after May 1 till October 31.

* * *

MAJOR HALL'S report to the Ministry of Transport on the collision which occurred on November 24, at Gale Street, between Barking and Dagenham, on the Tilbury section of the L.M.S.R., has been issued. The 6.7 p.m. from Fenchurch Street to Southend, which was running slowly preparatory to stopping for signals and was drawn by 4-4-2 tank engine No. 2116, was run into in rear by the following 6.17 p.m. train, drawn by a similar engine, No. 2149. Responsibility is placed upon the driver of the second train, in that, having missed certain signals in fog, he did not pull up.

* * *

COLONEL SIR J. W. PRINGLE'S report to the Ministry of Transport on the collision which occurred on November 25, in fog, at Finsbury Park station, L.N.E.R., has been issued. In this case the 1.17 p.m. express from Leeds to King's Cross, drawn by 4-4-2 engine No. 3290, ran into the rear of the up 10 a.m. from Edinburgh, drawn by 4-6-2 engine No. 2553. The collision was of a minor character, and was due to misunderstanding, as to which the inspecting officer comments and offers suggestions in regard to fog signalling at Harringay.

* * *

LIEUT.-COLONEL A. H. L. MOUNT'S report to the Ministry of Transport on the level-crossing accident which occurred on November 15, on the Fawley and Hythe light railway section of the Southern Railway has been issued. A motor-car was run into while crossing the line at an open type crossing, though, fortunately, without serious results, owing to the fact that the driver was able to turn his car in the direction in which the train was travelling, so that it was caught only indirectly. Most of the report is concerned with the motor-car driver's observation of warning notices and the location and exhibition thereof, blame being attributed to him.

* * *

MANY readers have gone to considerable trouble in sending information amplifying and correcting particulars given in the March number, as to the L.N.E.R. Locomotive Classification. Unfortunately, no two readers agree in every particular, and in many instances there are considerable discrepancies suggesting that some of the information presented is based upon hearsay, or that observation is sometimes superficial, while it may be that they have failed to recognise the particular series of engines bearing a given classification indication. Meanwhile the various lists are being concluded, and we hope to return to the subject in due course.

* * *

Commenting upon particulars given on page 248 of the March number, "A. C." points out that the order of Highland Railway engine numbers for engines now L.M.S. Nos. 14277—14285 was incorrectly given. "A.C." is, however, himself in error in certain respects, and the correct order is, according to the official list, 67, 82A, 86, 87, 88, 32, 33, 34 and 48. No. 48 was, however, still running recently in Highland colours.

* * *

IN connection with the Rugby match at Murrayfield, on March 19, the L.N.E. and L.M.S. Railways ran express day excursion trains at a fare of 24s. for the return trip. Corridor stock were used. In connection with the foregoing, the L.M.S.R. issued a special letterpress poster, attractively printed in bright blue and red ink on a white ground, "inviting" all and sundry to join, on the appointed day, its special corridor excursion leaving Euston station at 11.20 p.m. for Edinburgh.

* * *

THE Metropolitan Railway has issued an artistically-produced booklet, entitled "London's Pleasure Land," designed to direct attention to the many attractive country districts which it serves and to the facilities for pleasure parties, outings, walking tours, &c. There are three views in colour and others in half-tone, while the booklet includes particulars of the various cheap and party fares in operation, and of catering facilities and approximate charges at various places served.

* * *

COMMENTING on a reference in Locomotive Matters in a recent issue of THE RAILWAY MAGAZINE, to L.M.S.R., L.N.W. section 2-4-0 locomotive No. 817, *Constance*, which

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was built in 1866, Mr. W. L. Reid mentions that an older locomotive was recently noted at Edge Hill, Liverpool. This is 2-4-0 locomotive, belonging to Crewe North sheds, bearing the number 634 and named *Ellesmere*. The date carried on the name-plate is May, 1863.

* * *

MR. C. J. COGHLAN, of 34, Duncairn Avenue, Bray, Co. Wicklow, Ireland, would be glad to know of readers of THE RAILWAY MAGAZINE interested in Irish locomotives in Belfast, Londonderry, Sligo, Galway, Athlone, Limerick, Tralee, Cork or Waterford. He comments upon the fact that so many of those who contribute to the "Locomotive Matters" section with regard to Irish lines, appear to live in the vicinity of Dublin, although, presumably, a proportion of our fairly numerous Irish readers are located in other parts of Ireland.

* * *

THE Wimbledon Model Railway Club arrangements for April are :—April 4, 7.45 p.m. : Lecture on "North and South Shields Light Railway," by Mr. E. W. Chalmers Kearney. April 25 : Test Track, Monthly Competitions and Rummage Sale. April 23 : A visit to Eastleigh Works, Southern Railway, has been arranged.

* * *

MR. C. HAMILTON ELLIS, writing from Munich, sends a photograph showing one of the few 4-4-0 locomotives still in service on German lines. This particular type, known as class "B.XI," was introduced, on what was then the Royal-Bavarian State Railway, in the early 'nineties, and remained the standard type of express locomotive in Bavaria until 1903. The engines are two-cylinder compounds, and were among the first to be fitted with superheating apparatus. They were still fairly numerous at the close of the Great War, but in 1921, when the P.35, "15" class 4-6-0 locomotives were introduced for all but the fastest trains, large numbers of them were displaced. Since then, some have migrated to such centres as Augsburg and Ingolstadt, where a few are stationed for work on the country branch lines. Others have been broken up, together with the once famous "Hamburg" class 2-4-0's, which are now obsolete. The 4-4-0 in the photograph, No. 1325, was lying in a siding near Ulm, apparently condemned.

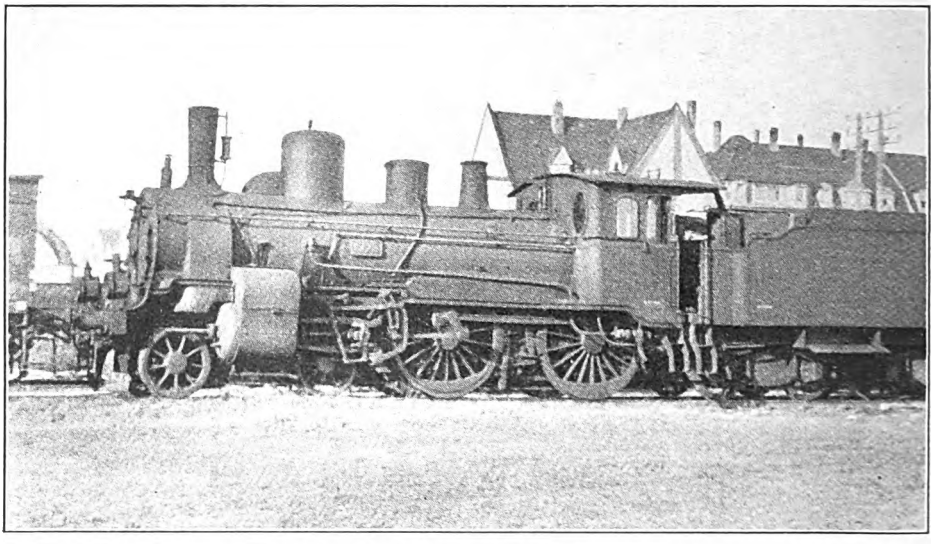

Photo.] GERMAN RAILWAYS (BAVARIAN DIVISION). [*C. H. E.*
4-4-0 locomotive No. 1325. Built by J. A. Maffei, 1899.

* * *

WRITING from New York, Mr. Eric Crickmay mentions that things are, speaking generally, quiet on United States railways. The "Twentieth Century Limited," from New York to Chicago, even in the dullest periods, goes out in three sections day after day. He mentions further that for this train and all its sections, carpet is laid down for the full length of the platforms from which departure is made, usually 27, 28 and 29. Referring to journeys

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which he makes frequently between New York and Boston on trains which cover 229 miles in 5 hours 10 minutes, Mr. Crickmay explains that the train load is usually eight cars on the "Knickerbocker," but there is plenty of time in hand. Twenty years ago, indeed, the train was ten minutes faster. "The electric engines now run through to New Haven—72·3 miles in 97 minutes—usually covered in 94 or 95—my best is 91½. The electrics are very welcome, as one is free from cinders and the running is just as smooth and almost as fast as with steam."

* * *

MR. T. R. COLMAN suggests that the Oxford district is almost unique, in that locomotives of all four groups can be seen regularly, although there are two stations only serving the city. G.W. and L.M.S. locomotives are, of course, always to be seen at their respective stations, while at the G.W. station both Southern and L.N.E. locomotives work certain through services.

* * *

THE new railway bridge at Dessouk, over the Western or Rosetta branch of the Nile in the Egyptian Delta, was officially opened by Mohamed Pasha Mahmud, Egyptian Minister of Communications, on February 12. The bridge has been built by Dorman, Long & Co. The Minister congratulated the firm upon its rapid completion of the bridge, which would result, he said, in a saving of at least £E.30,000 to the State Railways.

* * *

THE address at the weekly meeting of the Wolverhampton Rotary Club on March 8 was given by Mr. Cecil J. Allen, M.Inst.T., who by request took as his subject "British Express Trains." In so far as was permitted by the limited time at the speaker's disposal, he sought to prove that, whether judged on the basis of comfort, celerity, general convenience, or, most important of all, safety of operation, British main-line services have no rivals the world over. It was evident in the discussion that followed that those of the gathering who had travelled to any extent in other countries supported the views expressed. The audience was specially interested in the fact that the highest speed ever recorded by Mr. Allen—91·8 m.p.h.—was on the 6.10 p.m. from Paddington to Wolverhampton, with a Wolverhampton driver in charge on the footplate.

* * *

THE Westinghouse Brake and Saxby Signal Co. Ltd., have received from the Metropolitan-Vickers Electrical Co. Ltd., an order for 232 motor-driven air compressors, type DH-25, and 232 air pressure governors, type ES-16, for motor coaches for the Southern Railway. These are in addition to 251 compressors and governors of the same types previously supplied for the Southern Railway.

* * *

THE General Electric Co. Ltd., of Magnet House, Kingsway, W.C., and Witton, Birmingham, has just received an order from the London Electric Railway for the complete motor and control equipments for 64 motor coaches and 48 trailer coaches.

* * *

ON the question of "shortest" and "smallest" stations, "C.J.B." points out that at other places on the L.N.E.R. than those previously mentioned there are "rail level" or "short-platform" halts, while there are also "golf-platforms" halts here and there.

* * *

REFERRING to remarks on the North Wales narrow-gauge railway 0-6-4 Fairlie tank engine *Gowrie*, Mr. W. Beckerlegge writes that in the summer of 1922 this engine was in the yard of Mr. J. F. Wake, contractor, Darlington. It bore a Hunslet Engine Company's plate, makers' No. 979 of 1908, and J. Wake's plate number 1516—evidently rebuilt by J. Wake, for sale. It was fitted with the Westinghouse Brake when seen.

* * *

MR. ERIC CRICKMAY, writing from New York, sends a cutting claiming the distinction of the fastest inter-urban electric railway train in the world for the "Northland Limited," operated between Chicago and Milwaukee over the Skokie Valley route of the Chicago North Shore and Milwaukee Railroad. It makes the trip of 88·24 miles in two hours. This speed averages 51·91 m.p.h., not including the nine stops made *en route* or 44·12 m.p.h. including stops.

* * *

COMMENTING upon Mr. J. G. B. Sam's article on the West Croydon & Wimbledon Railway, published in the March number, "North Western" points out that only 8½ miles of the Croydon Merstone & Godstone Railway were built, as far as Merstone, so that through services could not have been worked in conjunction with the Surrey Iron Railway beyond Merstone. He also mentions that the gauge of these lines was 4 ft. An interesting point brought out by "North Western," is that, from the point where the Surrey Iron Railway leaves the crowded London area at Merton the land upon which it ran is still largely not built upon.

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Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

Two further ex-North Stafford 2-4-0T's, Nos. 1447 and 1451, are working into Broad Street, N.L. section.—[C. K. DOUGLAS.]

Consequent upon the breaking up of a number of N.L. tank locomotives, new standard 0-6-0's including Nos. 16433 and 16477 are employed on passenger duties. New 0-6-0T's Nos. 16502, 16503, 16506, 16512, 16514, and 16516 are working on the Midland section, London area.—[J. G. GLOVER.]

S. & D.J.R. 2-8-0 No. 88 has been employed on coal traffic on the Kettering and Nottingham line of the Midland section.—[J. G. GLOVER.]

"Precursor" 4-4-0 No. 5190, formerly No. 639, *Ajax*, is stationed at Longsight (16) shed, and may be seen often on Stafford and Crewe trains at Manchester (London Road). This allocation is in accordance with the new system on the L.N.W. section of permanently stationing batches of consecutively numbered engines at certain sheds, instead of, to quote a pre-amalgamation instance, No. 301, *Leviathan*, at Edge Hill, 302, *Greyhound*, at Bangor, and 303, *Himalaya*, at Crewe. An example of the new system is that "Claughtons" from 5900 to about 5954, and "Princes" from 5600 to about 5640 are all going to Crewe shed. "Precursor" No. 5254, formerly 218, *Daphne*, has been transferred from Longsight to Patricroft —[A. H. HORROCKS.]

Midland class "2" 0-6-0 No. 3654 has been rebuilt at Derby with Belpaire boiler and "pop" safety-valves and bears a plate marked "Rebuilt Derby 1926" "19-in." 4-6-0 goods No. 8797 has been noted at Stoke.—["MOONSTONE."]

L. & Y. 2-4-2T No. 10918 is regularly working suburban trains between Manchester Central and Cheadle Heath, Midland section. 4-6-4T's Nos. 11110, 11112, 11113, and 11119 are working from Manchester, London Road, to Crewe and Buxton, also on Staffordshire to Manchester trains. L.N.W. 4-6-0 No. 1352, *The Nile*, has been working Leeds and Manchester trains with the tender of No. 5394, *Phaeton*.—[R. DYSON.]

In the list of L.N.W. locomotives working at Cambridge, given in the February issue under this heading, No. 5030 (formerly No. 2002), *Madge*, by a transposition of the numerals appeared incorrectly as 5303.—[R. F. LANCHESTER.]

No Caledonian Section passenger locomotives are now at work on the Highland Section but a few 0-6-0 goods engines are to be seen working out of Perth. The bulk of the main-line passenger traffic is worked by the "Clan" class of 4-6-0's reinforced by a number of the "Castles." All the passenger traffic between Inverness and Wick is worked by "Castles," those at present on the duty being Nos. 14693, *Foulis Castle*, and 14676, *Ballindalloch Castle*, while an engine of that class is usually stationed at Helmsdale for intermediate working. No. 14682, *Beaufort Castle*, was recently seen working trains between Inverness and Forres. Cumming's outside-cylinder 4-4-0's Nos. 14522, *Durn*, and 14523, *Snaigow*, no longer work the through trains to Wick, but are engaged on intermediate work between Inverness and Tain, and Inverness and Elgin. About half-a-dozen of the "Loch" class have been rebuilt with larger boilers, but it seems unlikely that the whole class will be so treated. No. 14395, *Loch Garve* (not rebuilt) is meantime maintaining the service between Thurso, Georgemas Junc., and Wick. The small "Ben" class is distributed all over the system, and the Skye line trains are usually worked by that class, as well as the Black Isle branch. Nos. 14411, *Ben Loyal*, and

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14408, *Ben Hope*, were recently seen working between Inverness and Dingwall, and 14410, *Ben Dearg*, between Elgin and Keith. The Fochabers branch is at present being worked by an old Skye bogie, No. 14278, while two of the same class, 14277 and 14285, are still at Kyle of Lochalsh, and work several of the Dingwall trains. A few of the class, along with most of the old " Glens " and " Straths " have, however, been scrapped. No. 95, *Strathcarron*, still in old H.R. livery, is on yard duties at Forres, while another works the Hopeman and Burghead branch. All the Jones 4-6-0 goods engines are still in service, and work the bulk of the main line goods trains. No. 17619 (old 103) was recently seen at Alness on a Wick goods.—[J. D. SHERRIFFS.]

The new 2-6-0's ex Crewe are in traffic up to No. 13041. For the time being these engines have been turned out unpainted, but eventually they well be returned to the works for external finish. In this latter connection, it is interesting to note that the engines of similar type now being turned out at Horwich are all finished in the newest passenger livery. New 0-6-0's ex Andrew Barclay & Co., at present in service, are stationed as follows :—Nos. 4357-60 at Patricroft and No. 4361 at Shrewsbury. The painting of passenger engines has again been resumed at Crewe, and amongst those engines which have recently appeared in the new standard livery are 4-4-0's Nos. 302 *Greyhound*, 845 *Saddleback*, 1102 *Thunderbolt* and 1431 *Egeria* (new Nos. 5304, 5391, 5193, and 5201 respectively). Engines of all classes as they pass through the shops (whether painted or not) now have the new number in large figures affixed to the tender or tank sides, as the case may be ; whilst passenger engines are being adorned with the coat of arms and goods engines with the new L.M.S. panel, in accordance with standard practice. " Experiment " class 4-6-0 No. 353 *Britannic* (now No. 5452) has been rebuilt with a standard Belpaire boiler. Latest conversion to class " G 1 " (superheater) is No. 1815. This engine, formerly class " D " is now L.M.S. No. 9044. Recent withdrawals include 4 ft. 6 in. 2-4-2 T Nos. 820 and 1358 and Special D.X. goods Nos. 3106 and 3309.—[C. WILLIAMS.]

L.N.E.R.

New 0-6-0 No. 1492 was noted at Marylebone recently and 2-6-4T. No. 5336 at Aylesbury. G.E. section 2-4-2T. No. 8307 has for some time been working the Brill rail motor coach at Aylesbury.

[J. G. GLOVER.]

G.C. 4-4-0 No. 5113, is again working on the G.E. Continental Boat express. G.N. 4-4-0's Nos. 4368, 4369, and 4376, are on G.C. section. Further N.E. locomotives in the Lincoln area include 0-8-0's Nos. 902, and 2350 ; 0-6-0's Nos. 2358 and 2359. 4-6-2 No. 2562 *Isinglass* has returned from the north to G.N. main-line duties. Engines from Gateshead shed, working the 7.31 p.m. Grantham-Newcastle train (5.30 ex King's Cross) from June to October last, were N.E. 4-6-2 No. 2402 *City of York*, G.N. 4-6-2's Nos. 2570 *Tranquil*, 2571 *Sunstar* and 2572 *St. Gatien*. G.C. trains from Chesterfield to Lincoln are now worked exclusively by G.C. 4-4-2T's, including No. 6122. Old 0-6-2T's and 0-6-4T's have been handling the goods traffic from Chesterfield through Lincoln to Grimsby.—[G. EVERETT and F. STAPLETON.]

N.E. section locomotives at work on the G.E. section include 0-6-0's Nos. 379, 917, 1034, 1052, 2357, and 2387 ; and 4-4-0's Nos. 1540, 1880, 1927, and 1929. These work principally on the Cambridge main line, several being stationed at that city.—[AIDAN CRAVEN, C. K. DOUGLAS, and R. F. LANCHESTER.]

G.N. 4-4-2 No. 4402 is working C.L.C. local trains. G.E. 0-6-0T. No. 7394 is engaged on shunting duties at Manchester Central. The following Pollitt small 4-4-0's are working in the Manchester district :—Nos. 5268/70, built 1897 ; 5701/4, and 5707/9, built 1892 ; 5852/61, built 1898, 5862/81, built 1899 and 5694/9. Nos. 5690 and 5710 occasionally work into Manchester London Road from Barnsley district.—[R. DYSON.]

Old G.N. of S. outside cylinder 4-4-0 No. 6851, built by Neilson & Co. in 1878, has arrived at Cowlairs shops, N.B. section.—[A. KENNEDY.]

Several N.B. section passenger locomotives are working regularly on the G.N. of S. section out of Aberdeen. They all are of Holmes 4-4-0 class or their equivalent rebuilds, and are : Nos. 9037, 9211, 9734, 9735 and 9740.—[J. D. SHERRIFFS.]

G.W.R.

The following 0-4-0ST's were noted on a recent visit to Swansea Docks :—Nos. 696, 921, 929, 968, 974, 1098, also new 0-4-0T's Nos. 1101—1106. Old 2-4-0's Nos. 3511 and 3207 are working locally at Birmingham.

No. 4037 *Queen Phillipa*, rebuilt " Castle " class, is now running with a large tender. " County " class 4-4-0's at Tyseley Shed are 3813 *County of Carmathen* 3814, *County of Chester* 3816, *County of Leicester*, and 3819 *County of Salop*.—[JOHN S. SILVER.]

De Glehn compound 4-4-2 No. 102 *La France* has been withdrawn from service.—[R. DYSON.]

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S.R.

" King Arthur " class 4-6-0's Nos. 804E, *Sir Cador of Cornwall*, and 805E *Sir Constantine* have been working over the Eastern section main lines. S.E. & C., class " D " 4-4-0's, Nos. 470A and 505A have been rebuilt as " D1 " class, and have Ross " Pop " safety valves. Several further " D " class 4-4-0's are rebuilding at Ashford. L.S.W. rebuilt 4-4-0 No. 419E has been noted on the Eastern section lately.—[SIR BORS DE GANIS.]

4-6-0 No. 850E *Lord Nelson*, has returned to Nine Elms from Salisbury shed, and has been employed recently on the " Atlantic Coast " and Bournemouth expresses.—[JOHN A. STEEL.]

4-4-0's Nos. 776A and 779A, rebuilt Drummond 4-4-0's, 421E and 422E, and Drummond 5 ft. 7 in. 4-4-0 No. 145E have been observed at Chichester recently.—[B. S. POTTER.]

Class " K " 2-6-4T No. 808A, *River Char*, was noted at Tonbridge. 4-4-0's Nos. 34A, 441A, and 458A are the only domeless locomotives of class " B," Eastern section. Class " R " 0-4-4T No. 662A is employed on the Sevenoaks (Tubs Hill) and Sevenoaks (Bat and Ball) service, having taken over the duties previously performed by class " P " 0-6-0T's Nos. 178 and 323.—[E. J. NICHOLLS.]

Locomotives of the " 810A " 2-6-0 class at work on the Western section are being repaired and repainted at Ashford. Nos. 871 and 872 have since been employed on the Eastern section. Chatham section 4-4-0's are now being scrapped. They are being replaced by Stirling 4-4-0's (classes " F1 " at Gillingham and " B1 " at Faversham). Rebuilt Stirling 4-4-0 No. 240A stationed at Redhill for so many years has been transferred to Reading. 0-4-0T No. 313A is employed at Ashford works.—[G. E. GODDEN.]

" King Arthur " 4-6-0 No. 452E, *Sir Meliagrance*, concerned in the recent Fleet disaster has been repaired and repainted at Eastleigh and returned into service. The last of the Brighton batch of " King Arthur's " with six-wheeled tenders, No. 806E, *Sir Galleron* has been completed at Eastleigh.—[G.W.]

2-6-4T's Nos. 800-804 are working on Reading - Redhill services. 4-4-0 No. 0461E has been replaced at Guildford shed by 4-4-0 No. 595E. No. 734E *Clausentum* is on the shunting duties at Guildford usually performed by No. 0458, *Ironside*.—[J. COXWELL.]

Brighton " King Arthur " 4-6-0, No. 805E *Sir Constantine*, recently worked a Continental express from Victoria to Dover and back. 6-ft. coupled " mixed traffic " 4-6-0 No. 478E formerly at Bournemouth and now at Nine Elms was employed on an Eastern section Victoria and Dover continental express on February 8, with a load of 450 tons in each direction.—[T. H. DONOHUE.]

Ex-L.B.S.C.R. " Terrier " 0-6-0T formerly No. 72, *Fenchurch*, which was sold to the Newhaven Harbour Company in 1898, has returned to the Southern Railway with the acquisition of the Harbour company. The engine has been rebuilt with extended smokebox painted Southern black and numbered 636. 0-6-0T No. 136B has been lying derelict in a siding between Southwick and Shoreham since last August.—[L. WILLIAMS.]

IRISH RAILWAYS.

G.N.R.

Two of Cliffords 4-4-0 locomotives, No. 126 (ex *Diana*) and No. 156 (ex *Orpheus*), as rebuilt by Mr. Glover, have been noted recently working main-line expresses. Most of these Clifford engines have been rebuilt by Mr. Glover, with new boilers, " pop " safety valves, canopy cabs, Dreadnought vacuum brake ejectors, &c., &c., and are similar to the " 170 " class. 4-4-0 locomotive No. 12 (ex *Ulster*) is now stationed at Clones Junc. shed, and works on the Clones-Dundalk line. As new, this engine was stationed at Greenore, D.N. & G. Railway (L.M.S.) with a Great Northern crew, and worked a through dining car boat express to Belfast (via Newry) and back daily. This service was discontinued prior to 1914. A special engine shed was erected at Greenore for No. 12 and is still there. Occasionally No. 75 (ex *Jupiter*) worked this train. She was working on the Bundoran branch last summer.—[J. J. KENNEDY.]

G.S.R.

Nos. 428 (2-4-2T, ex 3, D.S.E.R.) ; 452 and 454 (4-4-0, ex 57 and 67, D.S.E.R.), have been returned to the Eastern section, renumbered. 0-6-0 No. 4 of the D.S.E.R. is now running with tender painted in G.S. colour and engine in old D.S.E.R. livery. Nos. 15, 16 (2-6-0), 30 (2-4-2T), 44 (2-4-0T), 56, 58 (4-4-0), and 34 (4-4-2T) are still running, bearing their old numbers. Two locomotives and four combined coaches are now under construction by the Sentinel Company of Shrewsbury for the G.S.R.—[J. COGHLAN.]

The following D. & S.E. section locomotives have been returned from Inchicore works after overhaul :—2-4-2T, No. 3 (428), 4-4-0 No. 67 (454), 4-4-0 No. 57 (452) (Bray shed), 4-4-2T No. 53 (460), and Beyer Peacock 1924 4-4-2T No. 34 (457) (Canal Street shed). All the G.S. & W. 0-6-0 engines stationed at Canal Street, and Bray for some time have been returned to their own section.—

[J. J. KENNEDY.]

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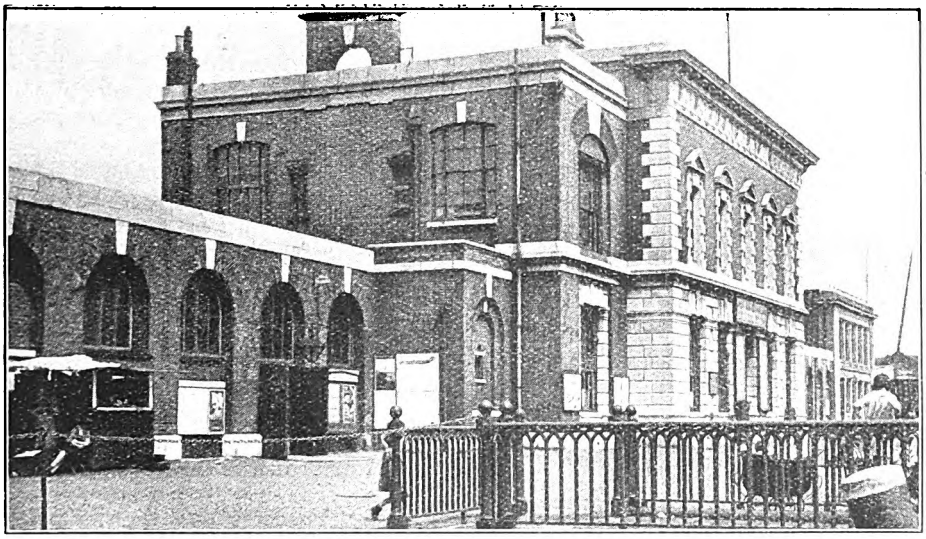

GENERAL VIEW OF RIVER FRONTAGE OF BLACKWALL STATION.

The London and Blackwall Railway.

By H. L. HOPWOOD.

(*Photographs by the Author.*)

BY the recent withdrawal of the Fenchurch Street and Blackwall trains, London has lost one of its oldest regular train services, and this circumstance may serve as a reason for presenting a brief account of the London & Blackwall Railway.

In point of age, the Blackwall line is the third of London's local railways, its opening in 1840 being preceded by that of the Greenwich & Croydon Railways in 1836 and 1839 respectively.* The primary object of the railway was to afford communication between the City and the East and West India Docks, and to convey steamboat passengers to and from the Brunswick Wharf at Blackwall. In connection with the latter part of the scheme, it must be remembered that pleasure steamers to and from Gravesend, Margate and other places were then far more numerous than they are to-day.

As authorised by Act of July 28, 1836, the line was to proceed from the Minories to Blackwall, but in 1837 an additional Act for a westerly extension to Lime Street was applied for. Opposition on the part of the Corporation of London, and other bodies, caused the Bill to be thrown out, but two years later, application to Parliament for an extension to Fenchurch Street was successful.

The line, of 5-ft. gauge (the same as that originally adopted on the Eastern Counties Railway) and laid with 50-lb. rails on cross sleepers, was opened from the Minories to Blackwall on July 7, 1840, the extension from Minories to Fenchurch Street following on August 2, 1841. At the latter date there were six intermediate stations, viz., Minories, Shadwell, Stepney, Limehouse, West India Docks and Poplar, the through-out distance being 3½ miles. From the Minories to West India Dock the line was carried on a viaduct consisting of 285 brick arches, mostly of 30-ft. span. In crossing streets, and the Limehouse Basin and canal, iron girder bridges were adopted, the bridge over Limehouse. Basin being formed of three 87-ft. spans, and that over Limehouse Canal of a single 87-ft. span.

Passing through a densely populated neighbourhood and with six (later seven) intermediate stations in the distance of

* The West London Railway also dates from 1840, but, except for a short period in 1844, it was not regularly used until 1863.

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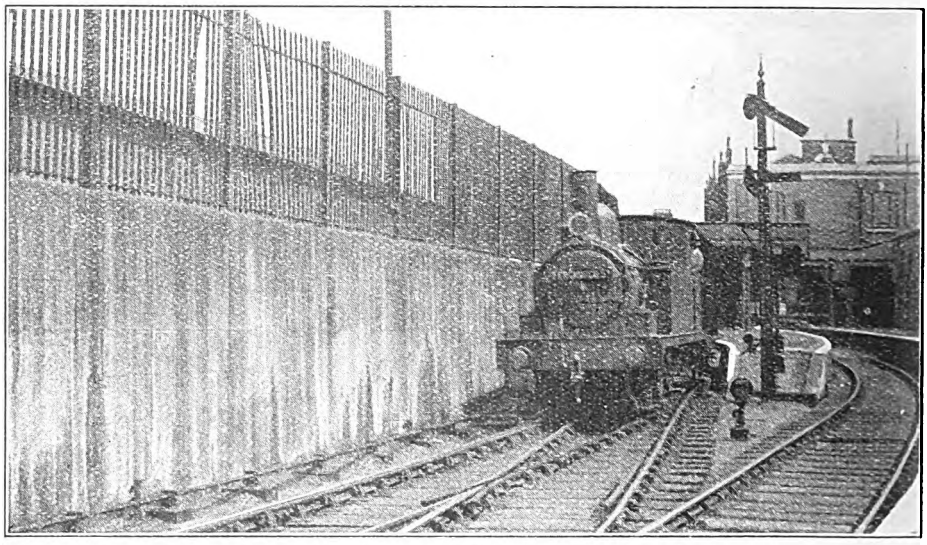
3½ miles, it was then considered impracticable to employ the locomotive—"the low speed and the time absorbed by stoppages, added to the danger attendant upon the burning coke flying about the roofs of contiguous houses, all presented themselves as impediments in the way of its adoption"—as Whishaw puts it in his "Railways of Great Britain and Ireland." Rope traction was therefore adopted, the trains being hauled up and down the line by means of stationary engines located at the Minories and Blackwall.

The engines at the Minories, supplied by Maudslay & Field, were of marine condensing type, developing 115 h.p. They had flywheels 17 ft. in diam., which, by means of cogs, worked the large rope drums, the latter being 23 ft. in diam. and 3 ft. 8 in. wide. The Blackwall engines, erected by the Horsley Company, were placed a short distance on the London side of the station. Of similar type to those at the Minories, they developed only 70 h.p., for the reason that the line had a slightly falling tendency as it ran east, the difference in levels between termini being 68 ft. Approaching both Fenchurch Street and Blackwall, however, there was a rise at 1 in 150 for a short distance, this gradient to some extent retarding the motion of the trains after they had been released from the rope. At each end of the line the engines were in duplicate, one set being spare.

The two ropes (one for each line) were each about 7 miles long, and as they wound round one drum, they unwound from the other, so that there was always about 3½ miles of rope on one drum, the remainder being on the line. The ropes first used weighed about 40 tons each, and to prevent any twist, swivels were introduced at certain intervals. Between the engine houses the ropes ran in cast-iron sheaves 3 ft. in diam., and spaced 33 ft. apart in the centre of each track.



FENCHURCH STREET TRAIN LEAVING BLACKWALL STATION.

The method of working trains was distinctly novel. In the first place, the usual term, "up" and "down" lines, was unknown, and instead they were called "north line" and "south line," and each was used alternately for traffic in either direction. In order to understand the system of working, it should be explained that when once set in motion the rope did not stop between termini, the carriages being slipped at intermediate stations. At the commencement of the day's work a coach stood at each intermediate station, and as the rope began to move, each vehicle travelled singly to the terminus. At the same time a train of coaches left Fenchurch Street and

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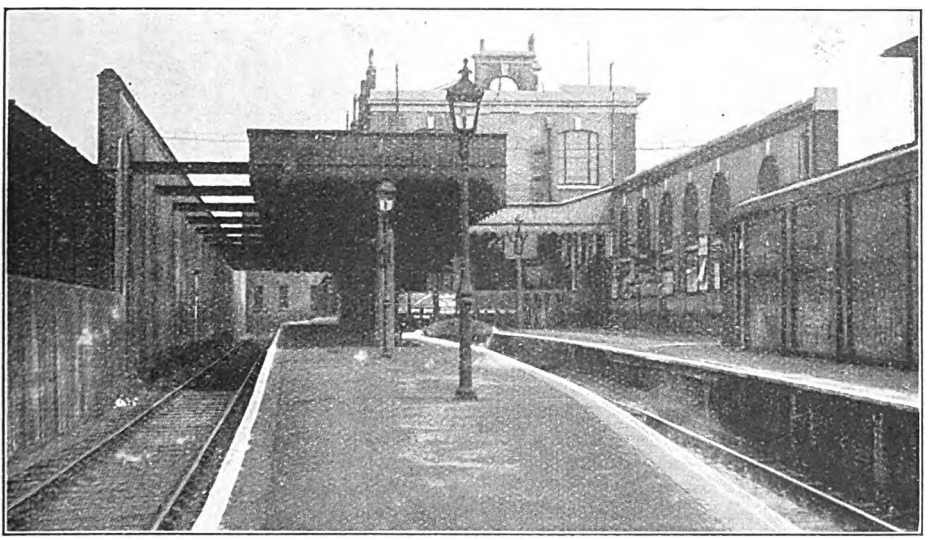
travelled by gravity to the Minories, where it was attached to the rope. The last (or seventh) vehicle was slipped at Shadwell, the sixth at Stepney, and so on, the first and second going through to Blackwall. The latter two had been preceded into Blackwall by the single coaches which had previously left intermediate stations, so that on arrival of the two there was a total of seven at Blackwall, ready to go back to Fenchurch Street on the same line. The coaches that had been slipped on the down journey remained at the stations until the rope moved in the opposite direction, when they ran into Fenchurch Street ahead of the main train, which, as it went along, slipped coaches at intermediate stations, as on the down trip, only the first two going through. From the Minories, where they were thrown off the rope, the coaches ran into Fenchurch Street by the force of their own momentum, the distance being only about 350 yards. This description applies to the working on one set of rails, but the same procedure was being simultaneously carried out on the other set.

Trains ran at 15-minute intervals between the hours of 8.30 a.m. and 8.45 p.m., and by the system of operation it will be seen that they left all stations at the same time. All movements were controlled by the Cook and Wheatstone telegraph apparatus. The carriages, all six-wheelers and painted blue, consisted of first-class, second-class or "Stanhopes," and composite vehicles. The first-class contained four compartments, each of which held 10 passengers, and measured 20 ft. long and 7 ft. 6 in. wide. The "Stanhopes," 18 ft. long and 7 ft. 6 in. wide, accommodated 70 passengers; they were practically open wagons, but furnished with roofs. All vehicles had extended platforms on which rode two guards or brakesmen, whose duty it was to work the slip gear and rope-gripping apparatus. Slipping was done by removing a pin from the couplings, whilst the rope was picked up or thrown off by means of a simple device actuated by a lever.



BLACKWALL STATION, INTERIOR.

Of the first-class compartments, Whishaw complains that "they are wanting in elbows, which would sometimes be exceedingly convenient to keep one aloof from an unpleasant fellow-traveller." He also expresses astonishment at "seeing several most respectably dressed persons riding in the Stanhope compartments, which are intended especially for those who cannot afford to pay for better accommodation." The fares were 6d. first-class or 3d. for a "standing place," but the latter figure was increased to 4d. from October 1, 1840.

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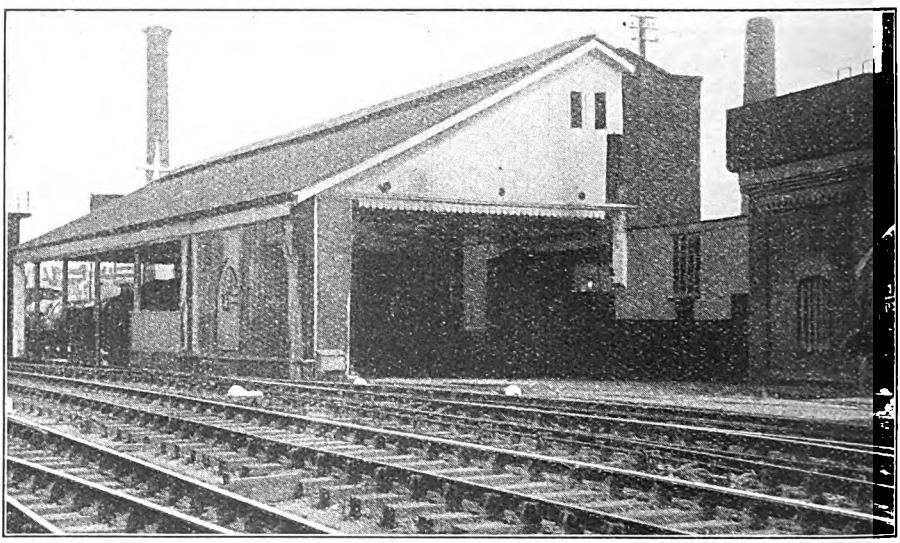
We have quoted somewhat freely from Whishaw (he is our authority for the early history of the line), but the following description of Blackwall station, from the Parliamentary Gazetteer of 1842, deserves to be recorded:—"The Blackwall terminus, nearly contiguous to the Blackwall Tavern, a locality of high repute amongst the City Apicii* and connoisseurs in gastronomy, consists of a rusticated basement and an upper floor with five windows, and is crowned by a bold block cornice of Roman Doric character. It is roofed in a light and elegant manner, and every precaution appears to have been taken to preserve the carriages and protect the travellers from the weather at inclement seasons."



ROYAL MINT STREET GOODS STATION, L.N.E.R.
Formerly Minories Terminus, Blackwall Railway.

To-day, the exterior of Blackwall station differs but little from that of 1840. The "light and elegant" roof mentioned above, was replaced by platform awnings about 20 years ago. Originally, there was an island platform and three roads; one of the latter being used as a carriage siding, but the present accommodation differs somewhat, and is as shown in the view of the station interior. The short bay line had been out of use for some years before the station was finally closed. The room above the booking hall was used as a Customs examination room in connection with steamers arriving from foreign ports.

Although most ingenious, the method of working the railway proved very costly. The original hempen ropes had been very soon replaced by wire cables, but even these suffered greatly from wear and tear and had frequently to be renewed. The provision of two guards to each vehicle was also a costly item. Breakdowns, with consequent delays to traffic, were a frequent cause of annoyance and did not tend to enhance the reputation of the Company. Added to this, the conversion of the adjacent Eastern Counties Railway to the standard 4-ft. 8½-in. gauge in 1844 left the Blackwall Railway, with its 5-ft. gauge, in an isolated position. The directors of the latter railway were not long in following suit, as Acts of 1845 and 1846 authorised the conversion of the railway to standard gauge, the construction of a branch from Stepney to join the Eastern Counties Railway at Bow Junction and locomotive power to replace the stationary engines and rope traction.

Conversion of the gauge; the opening of the branch from Stepney to Bow Junction (1¾ miles); and the working throughout by locomotives, all occurred on April 2,

* Apicius was a famous glutton who flourished in the days of Rome.

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1849; the stationary engines then being dismantled for re-erection at the City Flour Mills, Upper Thames Street. To prevent sparks from the engines doing damage to shipping in Limehouse Basin, the line was covered in with a light iron roof where it ran close to the Basin, and it is only within recent years that this roofing has been abolished.

The Bow branch brought a good deal of additional traffic to the railway, as very soon the Eastern Counties Railway commenced running to and from Fenchurch Street, via the new connection. At this period the North London Railway was approaching completion, and when opened from a junction with the Blackwall Railway at Bow Common on September 28, 1850, they also commenced a service to and from Fenchurch Street at 15-minute intervals. Two years later they formed a second junction with the same railway, at the Blackwall end. This was followed by the opening of the short branch which leads to the London and North Western Goods Depôt at Haydon Square.

On April 13, 1854, the London, Tilbury and Southend Railway was opened from Forest Gate Junction, on the Eastern Counties line, to Tilbury, and by arrangement was worked by that railway, the trains then running between Fenchurch Street and Tilbury, via Stepney, Stratford and Forest Gate Junction. At this period, it will be seen that in addition to the Blackwall local trains, those of the Eastern Counties (both for their own line and for the Tilbury Railway) and North London Railways were all using the two sets of metals between Fenchurch Street and Stepney, and to relieve the congestion a third line for up traffic between those points was provided in 1856, and the accommodation at Fenchurch Street increased. It may here be mentioned that a fourth line was added during 1894-5, but these two additional tracks do not serve intermediate stations west of Stepney.

On March 31, 1858, the direct Tilbury line was opened from Barking to Gas Factory Junction, on the Blackwall line, and from that date all Fenchurch Street and Southend trains were diverted to the new route. In the same year the old Minories station, which had become disused at an early date—probably in 1849—was leased to the Great Northern Railway, who converted it into the depôt known as "Royal Mint Street Goods Station." The space on the ground floor formerly occupied by the stationary engines is now laid with rails, and wagons are raised to the higher level by means of a lift. The accompanying photograph is of interest as showing what now remains of the first London terminus of the Blackwall Railway. The Midland Railway were not long in following the Great Northern's example, as a very few years later they also constructed a goods depôt at Royal Mint Street, practically next door to the Great Northern station. In 1864, the Blackwall Railway opened a short branch to serve the London Docks, but this has been disused for some years past.

The year 1865 was the final one of independence for the Blackwall Railway, as from January 1, 1866, the line was leased in perpetuity to the Great Eastern Railway, the latter guaranteeing dividends of 4½ per cent. to the Blackwall Company's shareholders.

The locomotives of the Blackwall Railway were 11 in number, all but two being passenger engines, and the following are particulars of the stock:—

L. & B. No.	G.E. No.	Name.	Builders.	Date Built.	Date Broken up.
1	91	Stepney	Jones and Potts	1848	1880
2	92	Shadwell	,, ,, ...	,,	1882
3	93	Blackwall	,, ,, ...	,,	1883
4	95	London	,, ,, ...	,,	1873
5	96	Bow	,, ,, ...	,,	1880
6	97	Thames	,, ,, ...	,,	1875
7	98	Victoria	,, ,, ...	1850	1880
8	99	Samson	G. England and Co. ..	1852	1881
9	100	Hercules	,, ,, ..	,,	1870
10	101	—	,, ,, ..	1860	1882
11	102	—	,, ,, ..	,,	1882

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All passenger engines were of similar type, viz., 2-2-2 well tanks of "Crewe" pattern. The single drivers were 5 ft. 6 in., and the leading and trailing wheels, 3 ft. 6 in. in diameter. Nos. 1 to 6 had outside cylinders, 14 in. by 20 in. (originally 13½ in. by 18 in.), and Nos. 7 to 9, outside cylinders, 15 in. by 18 in. The total weight was about 22 tons. They were very pretty-looking little machines, being painted blue and having chimneys furnished with copper caps.

The goods engines, Nos. 10 and 11, were not named. Of 2-4-0 type, with side tanks extending forward to the rear of the smoke-box, they had a very short wheelbase, with the trailing axle in front of the firebox, and consequently a very long overhang at each end. The outside cylinders were 15 in. by 22 in., and the coupled wheels 4 ft. in diameter, that of the leading wheels being 3 ft. All engines were shedded at Blackwall.

After 1868, North London trains ceased to use Fenchurch Street, being instead concentrated on Broad Street station, which had been opened in 1865. Commencing on September 1, 1870, however, the Broad Street and Poplar service was extended into Blackwall, via the junction which had been made in 1852. This service continued until June 30, 1890, after which date it once more terminated at Poplar, and the junction at Poplar between the two railways was taken out in 1900.

Until the opening of Liverpool Street station in 1874, Fenchurch Street was the principal London station for Great Eastern suburban trains, in preference to the old Bishopsgate terminus, which had very limited accommodation. Two additional Blackwall line stations were opened in 1872 viz., Leman Street and Millwall Junction, the latter being the starting point of the Millwall Extension Railway to North Greenwich. Opened for goods traffic on December 18, 1871, and for passengers on July 29, 1872, this line of 1 mile 49 chains was owned partly by the Great Eastern Railway and partly by the London & India Docks and Millwall Dock companies, in the following proportions:—Great Eastern Railway, 36 chains; L. & I. Docks Company, 41 chains; and Millwall Dock Company, 52 chains. Of the Great Eastern mileage, 5 chains were at Millwall and 31 chains at the North Greenwich end. In 1909, ownership of the intermediate portions passed into the hands of the Port of London Authority. The line, of very light construction, was worked by the Great Eastern Railway until 1880, when the Millwall Dock Company provided locomotive power, three small 2-4-0 tank engines being built for the purpose. These ran until November, 1922, when the Port Authority substituted a rail motor which had been purchased from the Great Western Railway. This vehicle is noteworthy for the fact that it is the only rail motor the engine portion of which has six-coupled wheels. It was built in 1907 for the Port Talbot Railway, a South Wales line with very severe gradients. The Millwall Extension Railway is of single track with a crossing place at South Dock, one of the two intermediate stations. A 15-minute service was run in connection with the Blackwall trains.

The short-lived Palace Gates and Blackwall service was inaugurated on January1, 1880, and for this purpose, the "Limehouse Curve," was brought into use. Extending from Salmons Lane Junction to Limehouse, it forms the third side of the triangle which exists in the vicinity of Stepney. Since 1882 it has also been used by the Midland Railway to reach their Poplar Dock Goods Depôt, which, together with a short branch leading thereto, was constructed in the year mentioned.

Ever since the year 1840, a 15-minutes' train service had been maintained to and from Blackwall (at first from the Minories, and later from Fenchurch Street), but, owing to a gradual decline of passenger traffic, the service was reduced from four to three trains per hour about 20 years ago, and from October, 1908, Sunday trains were withdrawn entirely. During the war, half-hourly trains became the rule, but after that the old service, at approximately 15-minute intervals, was restored. For some years the number of passengers using stations east of Stepney had been very meagre, and on more than one occasion the entire withdrawal of Blackwall trains had been under consideration. The General Strike of May, 1926, was, however, the actual cause of suspension; the trains on the Blackwall and North Greenwich lines ceasing to run after Monday,

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May 3, 1926. When normal services were resumed in July they did not include those mentioned, and in one sense, we must regret the passing of a service which it can hardly be realised had been constantly maintained for practically 86 years! Particulars of the service, as given in the September, 1925, timetables, may be of interest. Trains from Fenchurch Street ran practically every 15 minutes from 6.42 a.m. until 7.56 p.m. In the reverse direction, the first train left Blackwall at 6.50 a.m. and the last at 8.5 p.m. On Saturdays the last trains left Fenchurch Street and Blackwall at 2.55 and 3.5 p.m., respectively. On the Millwall Extension line the number of trains had been reduced from four to two per hour since the war, the first and last connecting at Millwall with corresponding trains from and to Fenchurch Street.

For many years Blackwall trains had been worked by the smallest class of 0-6-0 tank engine, supplemented occasionally by the more modern "1300" class of 2-4-2 side tanks. The 0-6-0 engines ("150" class) had 14-in. by 20-in. cylinders and 4-ft. wheels. Most of those on the Blackwall line ran minus the leading half of the coupling rods, so that, virtually, they were 2-4-0 engines.

It may be added that the London & Blackwall Railway maintained its separate title and survived as a leased railway until the end of 1922, when it was absorbed into the London & North Eastern Railway.

A WELL-KNOWN LOCOMOTIVE IN AN UNUSUAL GUISE.

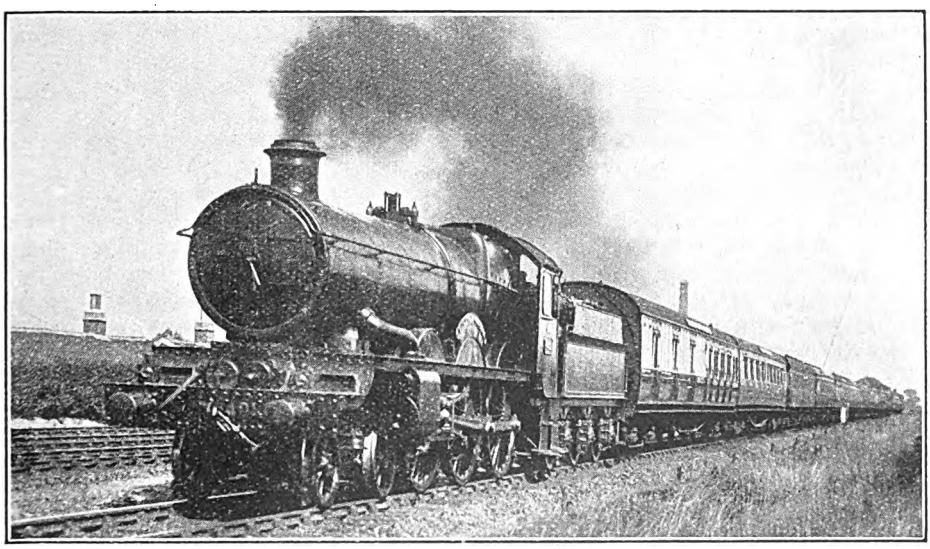

Photo.] [*F. R. Hebron.*

TORQUAY AND PLYMOUTH EXPRESS, G.W.R.

4-cyl. 4-6-0 locomotive No. 4082 "Windsor Castle."
Note safety valve cover removed.

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The Fascination of the Locomotive.

By BERTRAM JOY, A.M.I.Mech.E.

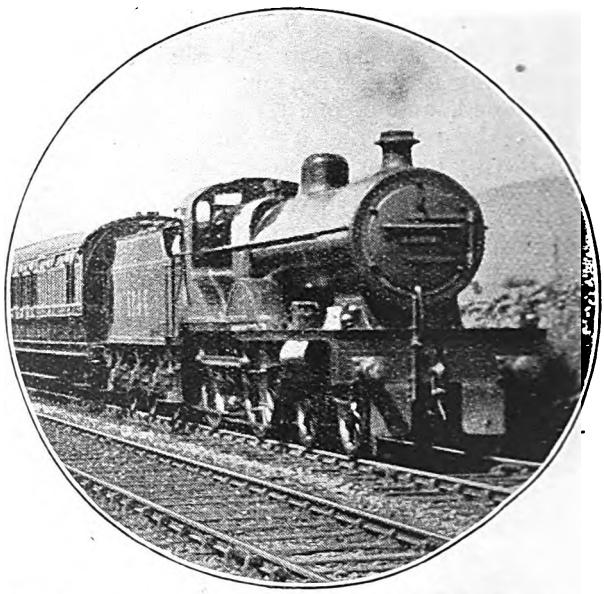

Photo.] [*C. J. L. Romanes.*

EXPRESS NEAR BEATTOCK SUMMIT, L.M.S.R.
Midland Type 4-4-0 Compound No. 1144.

FEW will deny that the steam locomotive exercises a peculiarly strong fascination over many persons of all ages, commencing—may one not say?—almost from the cradle and extending to the ripe age of three score years and ten, or even later. Indeed, one sometimes wonders what certain types of men found to interest and amuse them before the momentous years of Trevithick, Blenkinsop, Stephenson, and other pioneers. No doubt, the mere novelty of the locomotive would in the early part of the last century have proved an attraction, but this factor no longer exists; yet the railway engine is as attractive, presumably, now as ever it was.

Amongst those who are mechanically minded—though, perhaps, not engineers by profession—undoubtedly the manner in which the locomotive is thrust into their daily lives, its constant presence, its association with both business and recreation, account for a good share of the interest accorded to the machine. Other contrivances do not attract the same amount of attention simply because it is not easy to become acquainted with them—they are secreted in factories, or concealed within the engine-rooms of large ocean-going vessels, or otherwise hidden from view.

A large pumping engine is an attractive machine, a triple-expansion marine steam engine possesses many interesting features, a multi-cylindered Diesel oil engine or a large horizontal internal-combustion engine working on producer gas—any of these could hardly fail to interest the gentleman with the mechanical mind; but these machines are not accessible to the many, save only when they appear, some of them, as "exhibits" on quite rare occasions. So that the locomotive—the steam locomotive—comes in for its share, and more than its share perhaps, of favour.

Now, in the case of any piece of machinery, of whatever its nature, it is the moving parts that first attract the eye and compel the interest. The steam turbine is a wonderfully efficient and perfectly designed piece of apparatus, but from the spectacular point of view it possesses very little to recommend it. The modern tendency is to enclose the moving parts of machines to the fullest extent, so that, whilst lubricant is retained, dust and dirt are excluded; thus, in the case of much modern machinery there is hardly a moving part visible! Perhaps it is on account of the bareness of its moving parts and their visibility that the strong appeal of the locomotive is largely due. For instance, what more fascinating piece

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of moving mechanism can be found than that composing the connecting rods, coupling rods, and Walschaerts gear of a large modern outside-cylinder engine—with the movement of each individual part plainly discernible to the eye? Regarded from this point of view, it is fortunate, perhaps, that the moving parts of the locomotive mechanism are not, for various good reasons, encased—though, obviously, there would be some advantage resulting if this practice were to be adopted. Perhaps, too, the general tendency to place cylinders outside the frames—instead of inside them, as was common practice a quarter of a century back—has, by transferring a number of the moving parts to a position where they may be most easily viewed, tended to increase the hold which the locomotive has over certain large sections of the public.

It is not necessary to possess any great technical knowledge, apparently, in order to derive pleasure from the railway engine and its surroundings. Some years back the writer, travelling from Manchester to London (N.W. Section), found himself seated opposite to a fellow traveller supplied with a large note-book, in which from time to time some description of record was being made. On approaching Crewe the records became continuous, and it was then learnt that it was the *numbers* of the locomotives that were being jotted down—and Crewe would, of course, be *very* prolific in this direction. A few remarks of a slightly technical nature did not appear to interest this otherwise enthusiastic person at all. In addition to my Manchester–London friend, presumably there are others to whom the number on the cab-side of a locomotive is of supreme interest.

At the other end of the scale is the man of highly technical qualities who is quite unaffected—presumably by use—by the appearance and exterior details of the locomotive, but whose main thoughts flow in the direction of coal consumption per horse-power per hour, the design of superheater elements, sundry matters to be gleaned from a study of indicator diagrams, valve-setting problems, grate area, and other things down to the very deepest depths of technicality. And between these two extremes—the *number-ologist* and the technologist—there must surely be many grades of enthusiasts.

It certainly seems to the writer that a superficial knowledge of the working method of the locomotive is really desirable and assists and encourages a proper kind of interest in the machine. Should not one, for example, attempt to

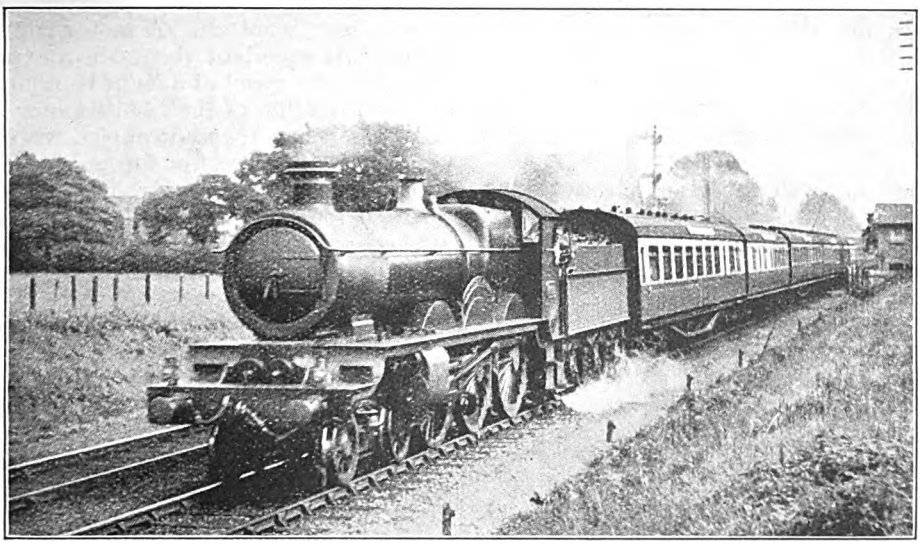

Photo.] WEST OF ENGLAND EXPRESS G.W.R. [*W. Leslie Good.*

4-6-0 Locomotive No. 4065 *Evesham Abbey.*

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visualise . . . the combustion of coal in the fire-box, the transmission of heat so produced through the firebox plates, &c., to the water on the other side of them, the conversion of this water to steam under pressure, the passage of this steam—on the opening of the regulator—through the superheater, the tremendous velocity of the steam passing along the pipes and ports into the cylinder, the sudden cutting off of the steam, the expansion and work done upon the piston, the movements of the piston with its rod and crosshead, the transfer of this movement to the engine driving wheels by the connecting rod, the enormous thrust upon this rod and the substantial weight upon the driving wheels, the adhesion between wheels and rail, the pull on the draw-bar, the great weight of the modern train, and, finally, its high and continuous rate of travel as it speeds on its journey mile after mile.

There is much else also in the working method to appeal to the man who delights in such matters—the study of valve gears, of injectors, of brake fittings, of sanding gear, and so on.

Great as is the enthusiasm displayed by young and old in the working of the locomotive, one wonders how much this might be augmented if it were possible for members of the public occasionally to travel on the footplate. There is undoubtedly a very great fascination—not merely the imaginary one of the small boy who wants to be an engine driver—in actually standing upon the footplate of a locomotive in motion and in observing the manipulation of the steam regulator, the careful and considerate handling of the reversing lever in "notching up" and many other interesting details of the drivers' art. The writer has to admit with regret that he has only on three fortunate occasions stood beside the driver in the cab of a moving engine—and one of these was without the consent of the authorities. If one or other of our large railway companies were to provide—on some local line—Sunday trips on the footplate they would be entitled to ask, and would probably get, quite considerable fares for quite short journeys. Perhaps this is, however, an idea altogether too fanciful to be treated seriously.

Naturally the historical side of the matter appeals to many locomotive enthusiasts, and it is the firm opinion of the writer that no other mechanical contrivance has a history which provides such a high degree of interest, instruction and anecdote as does that of the steam locomotive. Some of the railway engines of fifty, sixty or more years back possessed points of great interest and must have fascinated the enthusiasts of those days by the beauty of their outline just as much as does the present day giant fascinate by the impression of power, size and efficiency that it conveys.

Speed has always appealed to man, whether it be that of a horse, a motor car, an aeroplane, or, surely a train. But speed alone is not all. A motor car can double the speed of the fastest express train, but the speed of a *bullet* is infinitely greater than that of the fastest motor car. It is, one believes, speed coupled with the *weight* of the modern locomotive and train that is so impressive a thing. Six hundred tons speeding along the track at seventy or more miles per hour! This, if one can properly visualise it, is a stupendous achievement. There is an undoubted fascination in the high speed element. The writer has experienced it many times, and if the reader will stand on the platform at, say, Willesden Junction when a Scotch express is speeding through he will experience a very fine impression of enormous weight rushing along at high speed.

The not inconsiderable variation of type of the locomotive provides fascinating comparison and it is clear that in our great railway systems, where in some directions there is so great a degree of uniformity, engineers are not even now in agreement as to, either the number of cylinders, or number of wheels which should be embodied in the construction of the machines for which they are responsible. For we have express passenger engines with two, three and four cylinders, and with eight, ten and twelve wheels! Really a somewhat remarkable state of affairs and one that certainly helps to keep alive the interest of railway students and of all those to whom locomotive matters appeal.

There can be little doubt that the locomotive has received more attention at the hands of the model maker than any

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other mechanical appliance, and in this manner we get proof of its hold on those who are in need of a recreation of such kind as model-making provides.

In a brief chat recently with a model-making enthusiast, two outstanding points came under the notice of the writer. The first—that, to ride behind a miniature locomotive of one's own construction provided a keen thrill of satisfaction not obtainable in any other way, and second—that the handling of a coal fire on a diminutive fire grate was not at all the difficult problem that might be imagined, but that, by the aid of a blower, there was a wonderful controllability as to the heat produced and steam generated.

Indubitably, the steam locomotive has a powerful fascination for many of us and it appeals—railwayacs will all admit—to other of our senses than mere sight. The aroma of hot oil, of wind-blown smoke from the chimney, the noise of the steam blower at work, the rushing of feed water flowing into the boiler under the influence of the injector, the sudden roar of the "pop" safety valve or the gentle "sizzle" of the Ramsbottom valve, the "thimp-thump" of the Westinghouse air pump—these, and other matters all form part of the fascination of a machine, which constitutes the most wonderful combination of mechanical and other contrivances of this or, indeed, of any age.

L.N.E.R. (N.B. SECTION) LOCOMOTIVE FITTED WITH FEED-WATER HEATER.

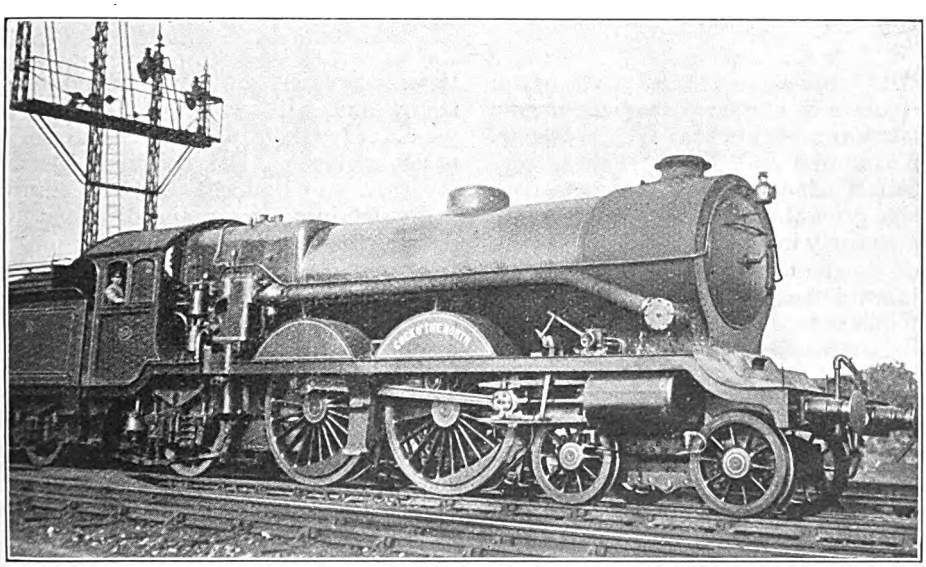

Photo.] [*R. D. Stephen.*

L.N.E.R. (N.B. SECTION) 4-4-2 LOCOMOTIVE No. 9903 "COCK O' THE NORTH."

Fitted with Worthington feed-water heater and boiler feed pump.

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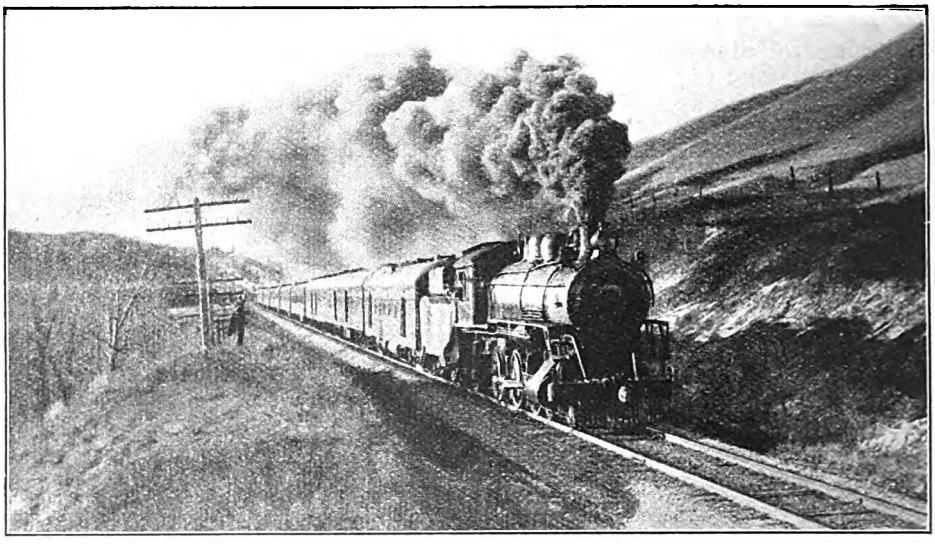

Photo.] **TORONTO EXPRESS, C.P.R., NEAR KEITH, ALBERTA.** [*C. R. Littlebury.*
4-6-2 locomotive No. 590 (Class "D9c.").

Telegraphs and Telephones on the C.P.R.

THE following particulars, sent on behalf of the Canadian Pacific Railway by Mr. Keith Morris, author of "The Story of the Canadian Pacific Railway," possess considerable general interest and we therefore quote it nearly in full :—

The Canadian Pacific has started work on a second trans-Canada telegraph line, 3,000 miles in length, extending from Montreal to Banfield, on Vancouver Island, and passing through Sudbury, Fort William, Winnipeg, Moose Jaw, Calgary, Nelson, Penticton, Vancouver and Alberni. At Banfield the line will connect with the second Pacific Cable Board underseas wire that goes through Fanning Island, Suva, Auckland and Sydney. This cable, which duplicates one laid down in 1902, is already in use, and was constructed at a cost to the Pacific Cable Board of about £240,000.

The new Canadian Pacific telegraph system will forge another link in the cable and telegraph chain between Great Britain, Canada, New Zealand and Australia. The first all-red route was constructed about a quarter of a century ago, between those countries, and this second one is being built with a view to obviate any possible breakdown through storms or other accident. The continent between Montreal and Banfield, British Columbia, is divided into eight grand divisions, each of which works simultaneously on the telegraph construction, so that the total time consumed is no greater than that taken in the laying of one division. The work is practically completed by this time at an estimated cost of about $423,520.

The establishment and expansion of the Canadian Pacific telegraph system is a characteristic phase of this great company's development. Though the Canadian Pacific Railway was not actually the pioneer in providing a telegraph system in Canada, the origin of the present efficient and elaborate service which exists at the present day synchronises with the construction of the main transcontinental road of the company. Previous to that time there was a telegraph service in Eastern Canada, in the main controlled from the United States, whilst in the

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western area there was a Government wire from the head of Lake Superior across the prairies to Winnipeg, Prince Rupert and Edmonton. It was necessary as railway construction proceeded to string wires along the track for the company's own use, and as these reached many points where there was no other service, they were put at the disposal of the public. In 1883 a telegraph superintendent was appointed with head office at Winnipeg, and thus originated the extensive C.P.R. service of the present time.

The charter authorised the Canadian Pacific to engage in the telegraph business throughout Canada, and on New Year's Day, 1886, a commercial telegraph department was established as another of the company's activities which were to become so manifold. The service, confined at that time to the first transcontinental line, has developed with the growth of the railroad and extended its sphere and expanded its usefulness by entering the many ramifications of the organisation as the company branched out. To-day it gives the public telegraphic communication with every part of the world by land wire, ocean cable and wireless.

The story of the development of the Canadian Pacific telegraph system is one of consistent progression, its elaborateness and perfection keeping pace with discovery and invention along its line. In 1912 the automatic printing telegraph was installed between Montreal and Toronto, and since that time all important Canadian cities served by the Canadian Pacific are linked up by this efficient method of communication. Another interesting and peculiar innovation of direct connection with the telegraph system is that of train despatch by telephone, which, first tried out on a Quebec division, has been adopted on the entire main line as well as a large number of semi-main and branch lines.

As the company's activities extended continuously farther and farther abroad, the telegraph system likewise extended its connections. From its inception it had exclusive connection with the Mackay system of the United States, giving it direct cable connection with the British Isles, Continental Europe, Japan, China, and other countries of the Far East, whilst by through arrangements with the postal company all Canadian Pacific points are in direct telegraphic touch with all important points in the United States.

In 1890 direct connection was obtained to Bermuda and the West Indies. Direct service to Australia and New Zealand followed in 1902 through the completion of the cable from Banfield, on Vancouver Island, to Sydney, Australia. In 1919, after the war, the British Government acquired one of the former German Atlantic cables, which terminated at Halifax, Nova Scotia, and a working agreement was entered into between the Imperial Cable authorities and the Canadian Pacific Railway, whereby traffic was to be exchanged exclusively. In addition, the Imperial authorities leased a wire from Halifax to Montreal connecting with the transcontinental wire, the representatives of the leasing board being British, Canadian, Australian, and New Zealand Government officials. A still more recent agreement with American companies gives the Canadian Pacific a direct cable service to Central and South America as well as an alternative service to the West Indies.

Still keeping pace with the progress of the times and the tendency in international communication, the Canadian Pacific entered into an agreement with the Marconi Wireless Telegraph Company for the exchange of ship-to-shore and trans-Atlantic business circulating over the Marconi system. In addition, the Canadian Pacific also reaches the Radio Corporation of America operating a wireless transatlantic service.

The result of these forty years of development has been to enhance the value of the Canadian Pacific as a factor in Imperial communication and Imperial unity, and the new telegraph system under construction will further strengthen the company's position in the fabric of Empire.

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A Station Without a Railway.

By "PENDENNIS."

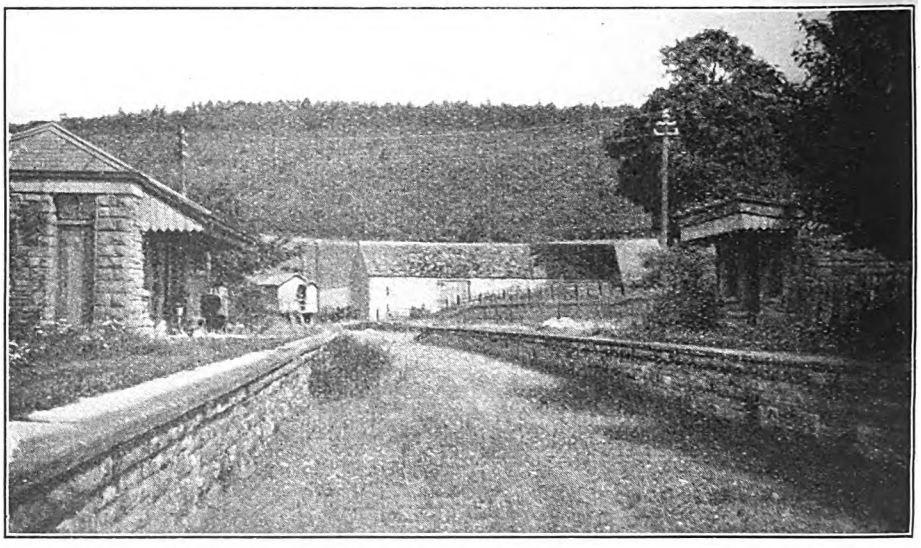

Photo.] [*H. S. Newcombe.*

PLATFORMS, WITHOUT TRACK, AT REDBROOK, MON.

VISUALISE a sheltered valley hamlet, a country station complete with its signal-box and other appurtenances, but devoid of anything in the nature of permanent way, and you have in a few words Redbrook, Monmouth.

Thanks to its situation on the western edge of the Forest of Dean, this quiet village is rather off the beaten track, and its railway associations can be easily missed by the casual visitor. The station lies back in a meadow and is separated by a sleeper stockade from the highway. Standing on the platform it is, indeed, hard to realise that it has seen twenty-four years of active service, which is, however, a fact.

The Coleford Railway Company was founded in 1883 to construct a line from Weysham Junction to Coleford, a distance of 5 miles 20 chains. This line was opened in September of that year, and was worked under an arrangement by the Great Western Railway, until it was finally taken over by that company in the following year.

In 1917, however, Government requirements necessitated the removal of the whole of the permanent way, which was dismantled, and shipped for service overseas, thus leaving a derelict line which is of peculiar interest to all railwaymen.

There is no intention, so far as is known, of reopening the section, but those interested might well pay a visit to this district while things are in their present distinctly picturesque state. The whole line is within easy walking distance of Coleford, or Monmouth stations, on the Great Western, and the writer can strongly recommend a visit to the "station without a railway."

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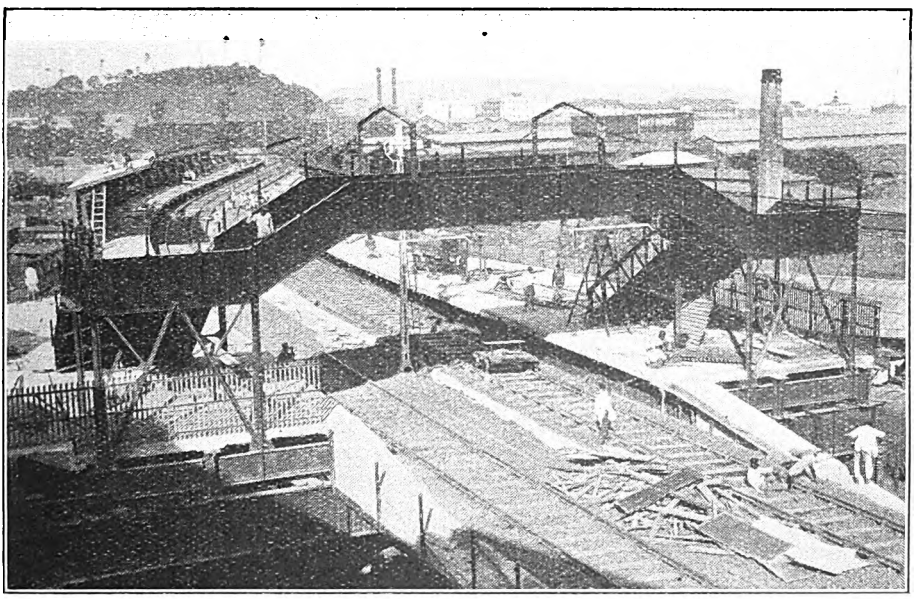

STATION AND TRACK CONSTRUCTION AT SANDHURST ROAD, BOMBAY.

Rail Laying and Relaying.

By R. S. SCHOLEFIELD, A.M.Inst.C.E.

III—NARROW-GAUGE RAILWAYS.

IN INDIA, railways of the metre-gauge are laid with flat-bottomed rails on wooden sleepers; and in this case the rails may, for the purpose of this article, be assumed to be of 40-lb. weight per yard, and 24 ft. in length. A party of six men can handle one rail, and will so carry about 53 lb. per man. These rails can easily be carried, 70 rails weighing 10 tons, on a pair of bolster wagons, and a pair of trollies will carry 28 rails or 4 tons. The sleepers are about 60 lb. each in weight, and one man can, therefore, deal with each sleeper. A wagon can carry 150 sleepers or 4 tons, and a pair of trollies can carry 70 to 75 sleepers, weighing about 2 tons.

It is usually understood that it needs two coolies in India to do the work of one British workman, and it is generally necessary to use large gangs of men to carry out any important work. Assuming a gang of 140 men, including gangers, but exclusive of material and packing gangs, the distribution of rail-laying work amongst them would be, say, 36 men to lift six rails, 27 men to lift the sleepers in three parties of nine, 40 men to handle 10 trollies, four men to each, 37 men to carry out the fishplating, spiking, and fastenings, and five gangers to supervise the whole.

As an example, a large gang of coolie platelayers of a strength of 529 men, including foremen, engaged in the laying of a metre-gauge line in India, was divided as follows:—172 men for loading rails, sleepers, and small material, trolley men, and carriers; with 357 men for placing the sleepers and rails, squaring the sleepers, marking the rails, straightening the rails and spiking them, fixing the fishplates, and packing the line when laid. Of the latter division of 357 men, 81 were engaged in spiking, 83 in

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packing, and 81 in boxing-up the sleepers.

One gang of men were engaged in half-fishing the joints, and spiked four sleepers for each pair of rails, ahead of a second gang which finished the fishing of the joints, and spiked the remaining five sleepers in each rail length. A third gang followed these for straightening and packing, and a fourth fully packed the road. A fifth gang with a jim-crow straightened the rails, tightened up loose bolts, and drilled bolt-holes in rails cut to a special length. The final and sixth gang of coolies boxed and trimmed the ballast. With this distribution of the gangs, it was found possible to lay a mile and a-half of railway each day.

On a 2-ft. 6-in. gauge line the rails will probably be of the same length—24 ft.—but may weigh, perhaps, only 36½ lb. per yard. Each rail will, therefore, have a weight of 292 lb., and can be carried by five men, who will each carry about 58 lb. Steel sleepers may be used of a weight of, say, 40 lb. each, a weight that can easily be handled by one man.

In this case the gang may consist of, say (with foremen), 189 men, divided into 29 men at the rail-head, 108 men as material gangs in two reliefs, 31 men as a packing and finishing gang, and 21 men for cutting and bending the rails. The men at the rail-head will probably be divided into 12 template men, who lay the sleeper templates, four men for fish-plating, four men for keying, and eight men attending to the fastenings, oiling them, and keeping up a constant supply to the fishplate men at rail-head.

The templates referred to are made of wood and are each the length of one rail. Projections are formed upon them, and upon the projections the steel sleepers are placed, thus ensuring their proper spacing, and making certain the level of the rail seats. Six templates are provided and laid down for three rail lengths, one template under each rail.

The material gang may be divided into four groups, each consisting of ten rail men, who will bring along the two rails, five men to each, ten sleeper men, handling the ten sleepers required for each two rails, and six trolley men. One of these groups, upon the arrival of the material train, will unload three pairs of rails with 30 sleepers and fastenings, and proceed to carry them up to rail-head.

The material train will then be backed to enable the second group to place four hand trollies on the line, and to unload 12 pairs of rails and 120 sleepers, the requisite fastenings being unloaded with the first lot of rails and sleepers, and to load them on to the hand trollies. The 12 pairs of rails can be loaded on the first two trollies, and the 120 sleepers on the other two trollies.

Whilst the second group of 26 men are moving their own load up to rail-head, the first group will return to the material train and repeat the operation with four other trolleys, and so on indefinitely. Generally the ten sleeper men advance with their ten sleepers, five on each side of the line, lay them on the saddles of the templates, and adjust them in line. The ten rail men follow immediately behind, five men with one rail on each side of the line, and place them on the sleepers, with their ends close up against the expansion irons. The ten men passing forward meet, and pass inside, the other ten men returning, and so the work goes on. A continuous supply of material is thus provided at rail-head.

When the gangs are thoroughly accustomed to their work it has been found that one rail length can be laid in two minutes, or even in 1½ minutes, which is about equal to a progress of one mile in 8¼ hours in the former, and two miles per day of 12 hours in the latter case. The rate of the work will, however, depend to a great extent upon the rapidity with which the materials are loaded up at the central depôt. In order to keep the relaying gang of 189 men fully supplied, perhaps 20 men for loading the sleepers, and 22 men for loading the rails will be required.

The loading of the rails into the wagons will be effected by means of sloping and greased rails, which form an inclined platform on which the rails slide down on to the trucks. If the rails are bent at the central depôt to fit the curves, great care should be taken to mark them, and to send the requisite number in order that there shall be no confusion at rail-head.

IV.—Track Laying in America.

The flat-bottomed rails used on the American lines may be taken as 30 ft. in

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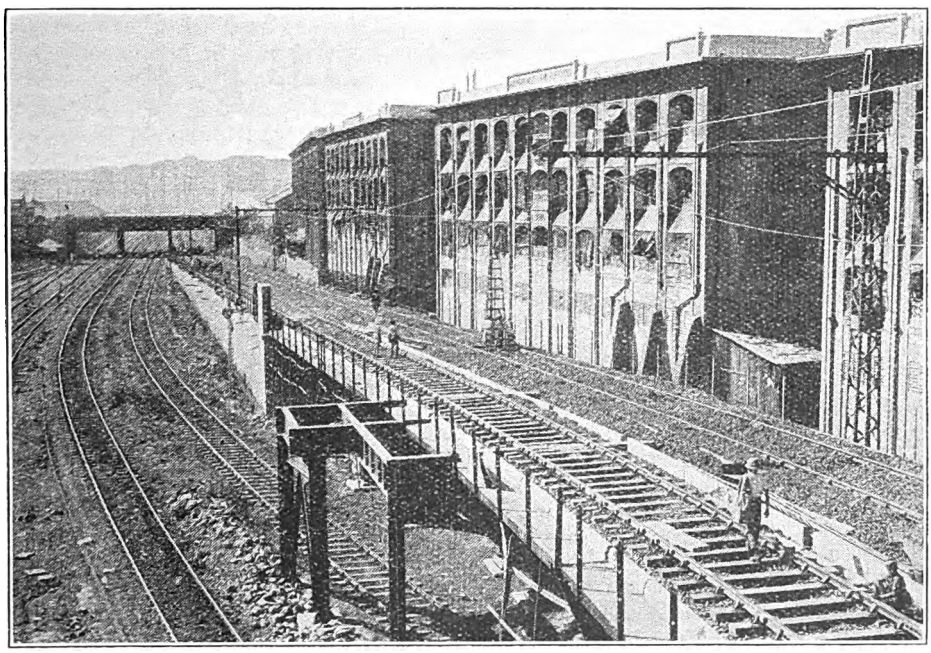
length, although many are made 33 ft., the latter meaning a reduction of 10 per cent. in the number of joints. Some of the lines are laid with 45-ft. rails and others in 60-ft. lengths, but the latter have been found difficult to handle, although easier to keep to a level running surface.

Continuous rails have been used to some extent, with the joints welded in the track, especially on street railways. These continuous lengths have been used 100 ft., 250 ft., 500 ft., and even 800 ft., with the welded joints, switch-points being



TRACK WORK ON NEW G.I.P. VIADUCT AT WADI BUNDIR, BOMBAY.

used at the ends of the length to allow for expansion, which in such lengths must be excessive at certain seasons. The sleepers in America are generally of harder wood than has been usual in England; the length is generally 8 or 8½ ft., and the cross section 6 in. by 8 in. to 7 in. by 9 in.

In many cases rails have to be removed from the track on account of the bending and wear at the ends alone. Frequently these rails are taken out, a short length at the end is cut off, and the rails are then replaced with the ends redrilled for the fish plates. When this method of shortening the rails is adopted the railways generally send out a special car upon which is placed a circular rail-cutting saw, say, 42 in. diameter, a straightening press, and a couple or three rail drills. The transportation of the rails is thus avoided, the handling of the rails being effected by pneumatic cranes.

Eight bolt-holes can in this way be drilled at one time, it being desirable that the drilling capacity shall be equal to the cutting capacity of the circular saw. From 400 to 600 rails can be handled and treated in one day.

A space is always left at the end of the rails to provide for expansion in hot weather. If this is not done, or if by any chance the rails are left touching at the ends, the probability is that the road will buckle during the heat and become dangerous. Heavy rails take more time to expand than rails of a lighter section—that is, a longer time is taken to absorb the heat; and as the time of greatest heat is comparatively short, it does not appear so necessary to provide for expansion in the case when the heavier rails are used.

Centre stakes are driven on straight lengths at 100 to 400-ft. distances, 50 ft. apart on curves, and 25 ft. on transition

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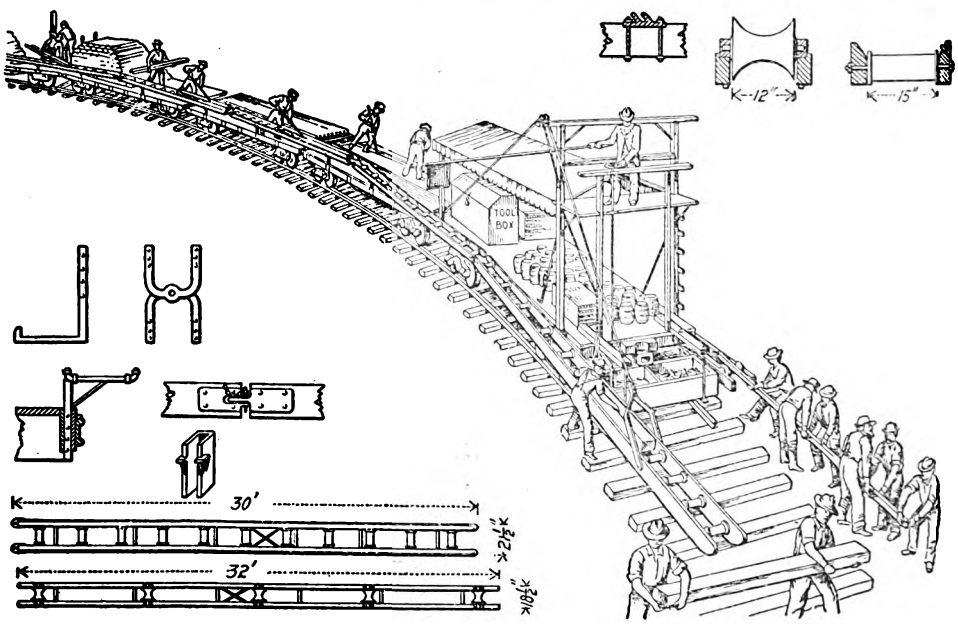
curves. Of course, stakes will be required at the beginning and end of all curves, and especially at the beginning and ending of transition curves. Before the track is laid the sub-grade or formation ballast must be properly dressed off, giving any allowance that may be determined upon, for the future sinking of the line. On curves where there is super-elevation the bottom ballast will be finished off to suit. Frequently the track is laid down by a contractor, who in this case will undertake the distribution of the material from the points of delivery, subject to the supervision of the railway company's engineer.



HOLMAN TRACK LAYING MACHINE.

As a rule, the railway company supplies all the material, and the supply or material train for the delivery at certain points.

The required number of sleepers are laid in advance of the rails, and in bolting-up the joints iron spacing shims are placed between the ends of the rails. Too many sleepers should not be laid in front of the rails, or the spacing of the joints may require the shifting of the sleepers under the rails, which is always troublesome. The sleepers should be adzed, where required, under the rail bearings.

The sleepers are sometimes carried out far in advance of the laying of the rails, by horse or mule teams; but in this case there is always the risk that the sleepers may have to be shifted, to suit the joints in the rails. The whole of the sleepers should be laid under the rails, and not only a few of them, since the rail supported at long intervals, although perhaps strong enough, is liable to get a permanent set under the weight of the quickly following material train.

The rails are taken from the material train up to the rail-head by a hand or horse trolley, and must be straightened or bent, as the case may require. The rails for curves under about 40 chs. radius are usually bent in a rail-bending machine. Care must be taken that the joints are square across the track, and do not run ahead one side more than another. To maintain this on curves, the inner rails must be cut correspondingly shorter.

A joint gang then bolts-up the rail joints, and a spiking gang follows to secure the sleepers to the rails. The rule is for the inside of the rails to be spiked first, and the gauge to be tried, before the outer spikes are driven. Another rule is for the outer spikes to be driven forward, and the inner spikes to the rear of the sleeper. Sometimes the gauge is kept by

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he use of bridle rods before the rails are inally spiked, the bridle rods, of course, eing carried forward for re-use after the piking is done.

A very usual gang for the laying down f permanent way consists of 55 men, livided into two groups of 27 men each, nd one man in charge of the horse or nule hauling the trolley from the material rain to the rail-head. In this case nine nen will load the trolley from the material rain, eight will be unloading the trolley, our for spacing the sleepers, and six will e splicing the joints. The other 27 men, n three sets of nine men each, will be piking the rails to the sleepers.

The trollies are of a heavier class than re generally used in this country. For emoving the trolley from the rails and eplacing it, a portable turntable is used. These trollies will carry six rails and a full upply of sleepers and fastenings. Three rollies will be required for the gang of 55 men. One trolley will be at the naterial train being loaded, another will e at the rail-head being unloaded, whilst he third trolley is making the journey rom one point to the other.

Two turntables, one at each end of the journey, will be necessary, so that the trolleys can be quickly removed from the rails and as rapidly replaced, whenever required. With this gang a progress of a mile in two days is quite to be expected. About 80 men are sufficient to lay one mile of road per day.

A gang of 164 men has been known to lay two miles per day. Across the prairies still more rapid work has been done, one record being six miles per day, with a gang of 182 men. This gang consisted of 18 men engaged in unloading, distributing and spacing the sleepers, in readjusting those displaced, and in attending the six horses used; 33 men hauling the sleepers; 48 men unloading rails from the cars, loading rails on trollies, and unloading and laying down the rails. Another lot of 51 men were divided into bolters, spikers and nippers, whilst another 32 consisted of spike peddlers or distributors, and sleeper loaders.

In America track-laying has often to be done in long stretches, and in some cases as many as 32 cars or wagons are used in one material train for laying permanent way. The train may be made up, say, with eight service cars in front of the train, a pioneer car, a store car, three dining and sleeping cars, a kitchen car, a feed car, and a water car.

The first may consist of a blacksmith's shop, store-room, office, five sleeping berths, telegraph office and tool-box, all in two decks. The second car has also double decks, store-rooms for clothing and provisions, sleeping berths, &c. The dining and sleeping cars may also have double decks, the lower floor being dining-rooms and the upper deck having sleeping berths for 32 men. The kitchen car probably has only a single floor, an internal size of 12 ft. by 32 ft., and is supplied with water from the water car. Special cooks are appointed, who bake bread each night.

The feed car carries feed for the horses, coal and wood for the use of the cooks, and the water car has probably two tanks, each of, say, 2,000 gals. capacity. The next eight cars will be flat wagons carrying rails and spikes; and 15 cars may be box cars for the carriage of the sleepers. One car is probably used for telegraph material, such as 25-ft. cedar poles, and reels of wire.

The sleepers are generally unloaded from the box cars by means of an inclined "chute," formed of sloping planks, which deliver the ties on to a horse-wagon standing at right-angles to the cars. The horse-wagons are then driven off to the rail-head, where the sleepers are at once unloaded and spaced for the rails. The rails are handled with the help of push-cars, which run upon the rails already laid. On the same push-car is provided a box to carry fish plates, bolts and spikes. The rails are unloaded on both sides of the car, say, 100 rails with fastenings being dropped on to the road bed.

The train is then moved back, say, 400 ft. and the 100 rails are then loaded on two rail push-cars, each of which carries 50 rails with all fastenings. These push-cars are also drawn by horses from the place of unloading up to the rail-head. Here ten men on each side of the car run forward with the rails and drop them on to the sleepers, together with the fish-plates and bolts.

Immediately the rails are laid down, a gauge is placed across them, fixing the distance apart, and the rail-lorries are then pulled forward by the teams another

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rail length. At certain distances a keg of spikes is thrown off, and the spike-peddlers place two spikes on each sleeper. In the meantime, two men in front are placing the fish-plates and the metal-expansion shims, and putting in the two bolts nearest the joints.

These are followed by men spiking the rails at the two ends, in the centre, and at quarter distances. More men follow on, completing the fishplate bolting at the joints, and completing the spiking to every sleeper. The "nippers" are men who hold the sleeper up to the rail, by means of a crowbar and a fulcrum made of a wood block.

When the laying has advanced so far and the 100 rails are laid down and spiked, the material train is now brought up again as far as it can go, and another 100 rails with fastenings are once more unloaded. The rail-car gang will drop 100 30-ft. rails in about 30 minutes, sufficient for 1,500 ft. of track. The rail-laying gang is followed by a surfacing gang of, say, 45 men, who make a safe running road, and so prevent sagging and bending of the rails, so far as can be, before the ballasting is done.

The average daily advance of the rail-laying gang may be taken as about three miles with a force of, say, 161 men, of whom perhaps 15 are unloading sleepers from the cars, 40 being teamsters for the wagons, 22 forming the rail-car gang, who drop the rails and fastenings, 12 who space the ties, 16 who spike the rails, and the remainder doing other kinds of work.

When, say, 50 or 100 miles of track has to be laid in America, a track-laying machine is frequently used. Such a machine has been found very useful where horses or mules cannot conveniently be used for distributing the sleepers and other materials; and the machine has proved its usefulness even when a considerable part of the haulage has been done by horses in addition to the machine. The use of such a machine also saves the cutting-up of the formation surface by the horse-wagons.

The track-laying machine does not actually lay the track, but it runs out the sleepers in front of the train on rollers or sliding paths, and delivers them right on the place where the track-laying gang is working, by means of a frame, projecting in front of the first car. Some machines deliver the rails by means of overhead trollies on a frame extending as a cantilever in front of the first car, the rails being lowered right on to the sleepers at rail-head. The machine dispenses with the large gang of men otherwise required to handle and bring up the heavy rails.

Supplies for half or a full day of all materials are carried on the train, and the machine is moved forward one rail length at a time, or as may be required.

Sometimes only half the full number of sleepers are laid down at first, leaving the remainder to be put in by a following gang, an arrangement that eases the work of the first gang, but it is better practice to lay down the whole number of sleepers at once, and thus reduce the liability of damage to the rails and joints. The speed of the work done when the track-laying machine is used depends upon whether the supply of materials to the track-laying machine can be adequately maintained.

One type of machine is run with a train made up of flat-topped cars, which are fitted on each side with conveyors or runways, generally the left sides for rails and the right side for sleepers. The conveyors are in sections suited to the length of car, and are made flexible at each joint to suit any curvature of the track. They have also a slight inclination towards the rail-head. They are not driven by power, but are used as rollers only.

The sleepers and rails are placed upon the conveyors at the sides of the trucks, and are rolled along them to the front of the train by hand, and on arrival at the rail-head the material is handled by the relaying gang and placed in the track. Both sleepers and rails of course come down the conveyors endwise, and the sleeper conveyor delivers some 30 ft. in advance of the rail conveyor, so that the sleepers can be readily laid one rail's length in advance of the rails.

The sleeper conveyor is suspended as a cantilever in front of the first truck, and is adjustable laterally, so that it can be slewed round to suit the curves; and where so required, as for instance on bridges, they can be delivered in the centre of the track.

The reason for the delivery of the rails on the left side is that the left rail is

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usually laid first and to correct line, the right-hand rail being laid by gauge from the left rail. Some machines have a cantilever frame by which the rails are run out on trollies. The pushing up of the train is signalled with flags from the top of the cantilever frame, and the train is usually marshalled at the depot, or at the place where the material is stored.

The train is usually made up of the cantilever-frame car in front, then three cars of rails, followed by six cars of sleepers, and then by the locomotive, the bolts and spikes being placed in tubs, bags or baskets on the pioneer car. As fast as one rail-length is laid the train is pushed up the same distance. It is always necessary to have a set of three rail and six sleeper cars ready loaded, somewhere at the rear, so that they can be brought up when the first lot of cars have been emptied. A length of 11,200 ft. of track has been laid with this type of machine, and with 63 men, in ten hours; and 10,000 ft. have been laid complete in nine hours, with a gang of 110 men.

Another arrangement of a track-laying train has a 2-ft. gauge tramway laid in the middle of the cars, right along the length of the train. The pioneer or front car has a projection or cantilever in front, 20 ft. ahead of the car. This is supported from a gallows frame, 10 ft. high, on the first car.

The sleepers are carried along to the front by a trolley 5 ft. by 9 ft., which is made so that the sleepers will be shot out in front of the cantilever; the trolley tilts automatically and throws the sleepers down in front of the train, ready to be distributed by the sleeper-laying gang. The cars carrying the rails have a series of rollers inside the tram-lines, and the rollers form a runway along which the rails are pushed towards rail head.

Two portable independent frames, with rollers on the top, and resting on the sleepers already laid, are placed at intervals of 15 ft. in front of the cantilever of the first car. The rails are run forward over the cantilever out upon the portable rollers until the rear ends are free of the cantilever, and are then lifted down upon the sleepers by the rail-laying gang. For ordinary work the full number of sleepers are laid down under the rails, but if the work is hurried, only half the sleepers are laid at first, the remainder being put in under the rails by a following gang.

Sometimes the pioneer car has an overhead projecting frame which carries hoisting pulleys and rail-tongs. In this case the rail is run out ahead of the car, and is then lowered to place without the use of the independent rollers. With these methods, and a gang of about 120 men, it is practicable to lay two miles of track in nine hours.

A third arrangement is similar to the first in having runways along each side of the cars, but in this method the rollers are driven by power—of course a more complicated arrangement.

Each runway has a shaft connected by bevel gear to each roller, the shafts being worked by flexibile connections between the lengths of runway. The rollers used for the conveyance of the sleepers are corrugated, and those for the rails are double, one for each line of rails. An engine on the pioneer car, driven by steam from the locomotive, may be used to revolve the shafts.

In this case the sleepers are delivered, say, 60 ft., and the rails 6 ft., ahead of the pioneer car. A force of 110 to 130 men has laid down 6,500 ft. of track in 3½ hours by this method.

Another and fourth type of track laying is different from the previously-described methods in that the pioneer car is self-propelling, and by its own power can haul a train of 15 heavy supply cars. The pioneer car is carried on three trucks, each of which is driven by power. Upon the car are two engines of 100 h.p.

A steel truss projects 60 ft. in front of the pioneer car, and is 8 ft. above the track, and in this case the rails are handled by trollies on the bottom chords of the truss, the sleepers being handled by a chain conveyor passing over the top chords.

The machine hauls forward along the train two continuous strings of rails, and the rails form in themselves a conveyor upon which the sleepers are placed and carried along. When the sleepers thus carried with the rails arrive at the pioneer car, they are lifted up by the chain conveyor passing over the top of the truss, which can be swung about as required to suit the curves or the bridges. A length of 2½ miles of track has been

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laid in this way in a 10-hour day with a gang of 40 men.

The fifth type of track-laying machine has for its special features that the rail and tie conveyors are both driven, and the rails handled by power. Here the pioneer car has a cantilever projecting 20 ft. in front. The sleepers are run out in front of the car, and these are followed by rails which are suspended by tongs from the bottom of the projecting truss. A spiking gang follows the track-laying gang and spikes the rails whilst the sleepers are being distributed in front. With rails 33 ft. in length, and a gang of 28 men, about 2½ to 3 miles of permanent way has been laid down in one day.

Sometimes the rails only are handled in this way by the conveyors or runways of the track-laying machine, the sleepers being taken to the rail-head by means of horse or mule-wagons.

Generally, when the ballasting has to be done, the line with the sleepers is jacked up and the ballast is put in underneath. Gondola cars, say, 40 ft. long, having up to a 50-ton capacity, are frequently used for the conveyance of ballast, whether for depositing by hand shovelling, ploughing or dumping. The ballast is generally loaded into the cars by a steam shovel, or by means of a conveyor.

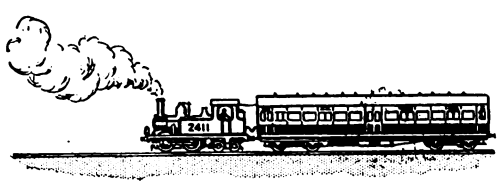
When the ballast is unloaded by "ploughing," iron aprons are provided for the cars, to prevent ballast falling on the rails; and the ends and sides of the gondola cars are released. A wedge-shaped plough, the full width of the car, is shaped to throw the material off on one or both sides of the car, as may be required.

A steel cable, to which the plough is fastened, is then hauled through the whole length of the train of ballast cars by the pull of the locomotive, which is uncoupled for the purpose, the cars, of course, being firmly braked to ensure their standing still. Sometimes the cable is operated by a winding-engine, fixed on the front car next the locomotive, which supplies it with steam.

When the ballast is dumped, the cars have a bottom forming a longitudinal hopper, having doors to deliver the ballast in the centre or at the side of the track. The quantity of ballast delivered is determined by the size of the opening of the hopper and the speed of the train; and sometimes the ballast cars have transverse divisions, so that one or more pockets can be opened as required.

Frequently a steel plough is fastened to the rear of the ballast train, and this ploughs down the material between the sleepers, and out over the rails, so that it is ready to be put under the sleepers at once when they are jacked up. Sometimes each ballast car has its own plough at the front end, instead of levelling off the whole from the rear of the train. A spreader car is sometimes used, which spreads and levels the ballast to a width of 15 ft. or 20 ft. on one or both sides of the track.

[Certain photographs reproduced are published by the kindness of the late General Manager of the L.M. and S. Railway, and the line-sketch (page 354) by the courtesy of the McGraw-Hill Publishing Co.]



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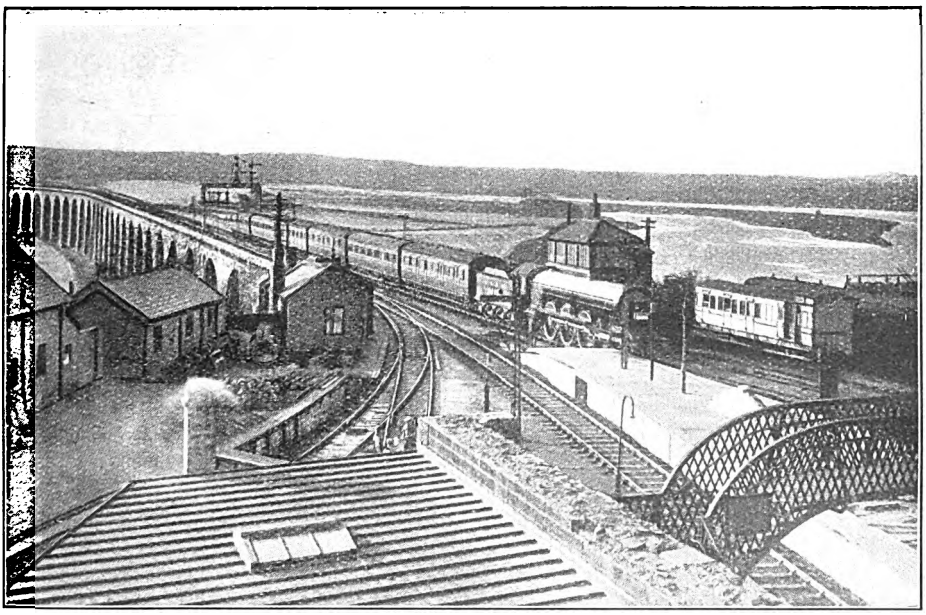

TRAIN ENTERING BERWICK STATION FROM ROYAL BORDER BRIDGE.

Reconstruction of Berwick Station, L.N.E.R.

THE original station at Berwick was constructed about 80 years ago. The arrangements comprised up and down platforms, 156 yards and 153 yards in length respectively, of an average width of about 12 ft., and the height above rail level was 2 ft. 3 in. The station was partly situated on a curve of 9 chains radius. Both platforms were roofed over for a distance of 73 yards, a narrow footbridge giving access from the booking hall and other offices on the up platform to the down platform. A small waiting room was provided on the down platform, but all other facilities, including waiting rooms, booking office, refreshment rooms, telegraph office, bookstall, tobacco stall, &c., were situated on the up side.

The old station buildings were built in masonry, the main elevation being in the Scottish baronial style of architecture. Due to bad foundations, the whole building was badly racked. In addition to the main passenger lines through the station, there existed two through lines on the west side, one a down goods loop, and the other an Exchange line, known as the "Newcastle Lye." The old station will be familiar to most of our readers.

The reconstruction work comprised three separate stages: (1) The provision of an up goods loop between Berwick North and Central boxes; (2) a new bridge on the site of the old bridge at Castlegate; and (3) the new station works and signal-boxes. The first part was completed in 1916, and the second in 1921. The station works were authorised by the Directors of the North British Railway in November, 1914, but for war reasons had to be deferred, and were not started until April, 1924.

The work included a new island platform for up and down line traffic, with waiting rooms, refreshment rooms, bookstall, telegraph office, &c., on the platforms, and a booking office, parcels office, and refreshment room staff accommodation on the site of the old buildings, access to the platform being provided by a covered footbridge 10 ft. wide. Provision is made at the south end of the main station build-

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ings for dealing with luggage to and from the parcels office and platform, by means of two 30-cwt. electrically-operated hoists, connected by a luggage bridge. In the event of platforms for local trains being provided, in the future, in the space now partly occupied by the down sidings, to the west of the new platform, the luggage bridge and footbridge can be extended to these new platforms. The main station access road has not been altered, but a new access stair and footpath, 5 ft. wide, from the Castlegate Bridge to the booking hall, has been provided.

The up and down platforms are 813 ft. and 807 ft. long respectively, to top of ramps, the corresponding maximum and minimum widths being 46 ft. 7 in. and 12 ft. 6 in. Openings are provided through the platform at the north and south ends for point rodding and signal wires. As the platform walls had to be built in sections, to suit traffic working, rapidity of construction was essential, and it was therefore decided to construct the walls of reinforced concrete sections, each 6 ft. long, 4 ft. 6 in. high, the breadth of the base being 2 ft. 3½ in. and the top 1 ft. 3 in., the weight of each section being about 25 cwt. The sections were laid on a concrete foundation, 3 ft. wide by 1 ft. deep, by means of a travelling hand crane. The down platform wall was built first, and was completed in 18 working days, the up platform being constructed in 12 days. The average length of platform built in one day was nine sections, or about 54 ft., and the maximum length 16 sections, or about 96 ft. The granolithic surfacing, which covers the whole extent of the platform and ramps, was not laid until the filling and bottoming were well consolidated, passenger and barrow traffic being carried on a temporary surface of ashes and sleepers, until such time as the granolithic could be laid.

Under the glazed roof, over the island platform, about 240 ft. in length, two blocks of buildings, 101 ft. and 77 ft. long, have been erected. The larger contains the first-class and third-class refreshment rooms, with kitchen between. A bookstall, 17 ft. 9 in. by 12 ft. 9 in., occupies the south end of the block, facing the overline footbridge. The smaller block contains the ladies' first-class and third-class waiting rooms, a general waiting room, and the station master's offices. A length of 20 ft. separates the two blocks of buildings, thus giving a free circulation for traffic across the platform. The dado of the walls of the buildings is of pressed brick, with dressed stone base and cill courses, the upper portion of the walls being of timber, with suitable spaces for advertising purposes.

The telegraph and inspectors' offices are contained in a separate block of buildings, 30 ft. long by 14 ft. 6 in. wide, situated south of the footbridge. The construction is on similar lines to the buildings under the platform roof. The lavatories occupy a site north of the overhead bridge. This block of buildings, 46 ft. long by 8 ft. 6 in. wide, is built of pressed brick with a reinforced concrete roof, and the internal face of walls is finished in white enamelled brick. In the walls are various openings fitted with wrought-iron grills, thus affording good lighting and ventilation. Accommodation for porters, and a battery store, is provided under the footbridge.

The footbridge, which connects the island platform with the booking hall, is covered in, the main members being steel lattice girders, the floor formed of reinforced concrete slabs resting on steel cross joists and the portion above girder level of timber with glazed lights. The hoist towers are connected by a lattice girder bridge, the towers themselves being formed of steel angles, braced together by angles and channels, and covered by timber lining. Each hoist has a lifting capacity of 30 cwt., and a speed of 70 ft. per minute. The hoists are electrically operated, and the gates, which are of the collapsible type, are fitted with up-to-date electric locks.

The main block of buildings, as already stated, comprises a spacious booking hall and office, parcels office, cloak room, and staff office, on ground floor, and accommodation for the refreshment room staff above. It has a length of 115 ft., and a depth of 38 ft., and is built of Dumfriesshire red sandstone. The central portion is two storeys in height, and the sidewings single storey, a glazed veranda, 57½ ft. long, being provided over the pavement. The whole of the stone work is of tooled ashlar.

The booking hall measures 55 ft. in

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length by 38 ft. in width, and is 15 ft. high, and has a communicating door to the parcels office and cloak room, 35 ft. by 27 ft. The booking office is divided from the hall by a framed, panelled, and glazed screen. Three ticket openings are provided, one each for "North" and "South" traffic, respectively, and a third for excursion business and general inquiries. The hall has a lined dado 3 ft. 9 in. high, the upper walls and ceiling being in plaster. The floor is of concrete, with granolithic finish. The refreshment room staff accommodation consists of sitting room, kitchen, scullery, three bedrooms and bathroom.

The fittings in all the rooms are of the latest type.

The waiting rooms, refreshment rooms, bookstall, and other offices on the island platform, as well as the booking office, parcels office, and the staff office, in the main building, are heated by cast-iron two-column hot water radiators supplied from a boiler in the heating chamber provided in the basement of the main building.

The work was carried out under the supervision of Mr. William A. Fraser, M.Inst.C.E., Edinburgh, Engineer, Scotland, London & North Eastern Railway. With the exception of arranging the operations to suit traffic working, and some trouble with the foundations of the main buildings, no difficulty was experienced in carrying out the work.

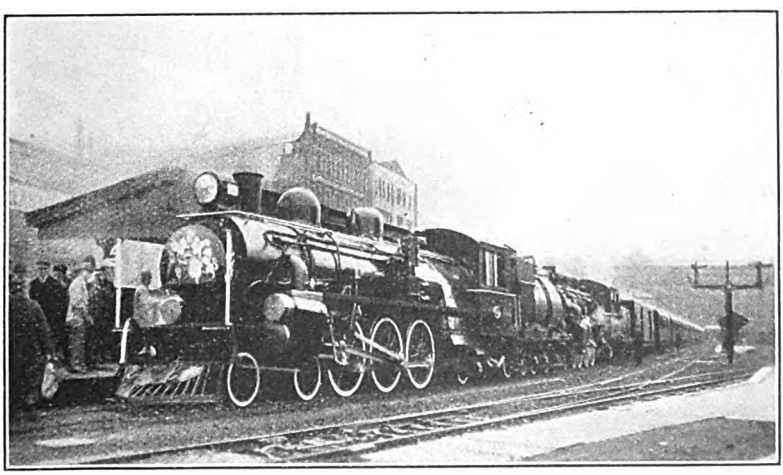
Hugh Symington & Sons, Glasgow, were the contractors for the station works, which were held up for a time by the firm going into liquidation, but were completed by the liquidator. The luggage hoists were supplied and erected by Wadsworth & Co., Bolton.

The permanent way and signalling works were carried out by the company's staff, and the electrical work in connection with the hoists and lighting by the Electrical Engineer's staff.

WITH THE ROYAL TRAIN IN NEW ZEALAND.

FOR the journeys of T.R.H. the Duke and Duchess of York on the New Zealand Government Railways (North Island Section) a special sleeping and saloon car constructed in the railway workshops was used with other vehicles as required.

The train included luggage van, sleeping car for the personal staff, two day cars and two *de luxe* sleepers, with a staff dining car, behind which was attached the kitchen car, the Royal dining and private cars being at the rear.



Photo] [*W. W. Stewart.*

ROYAL TRAIN LEAVING AUCKLAND FOR ROTORUA.

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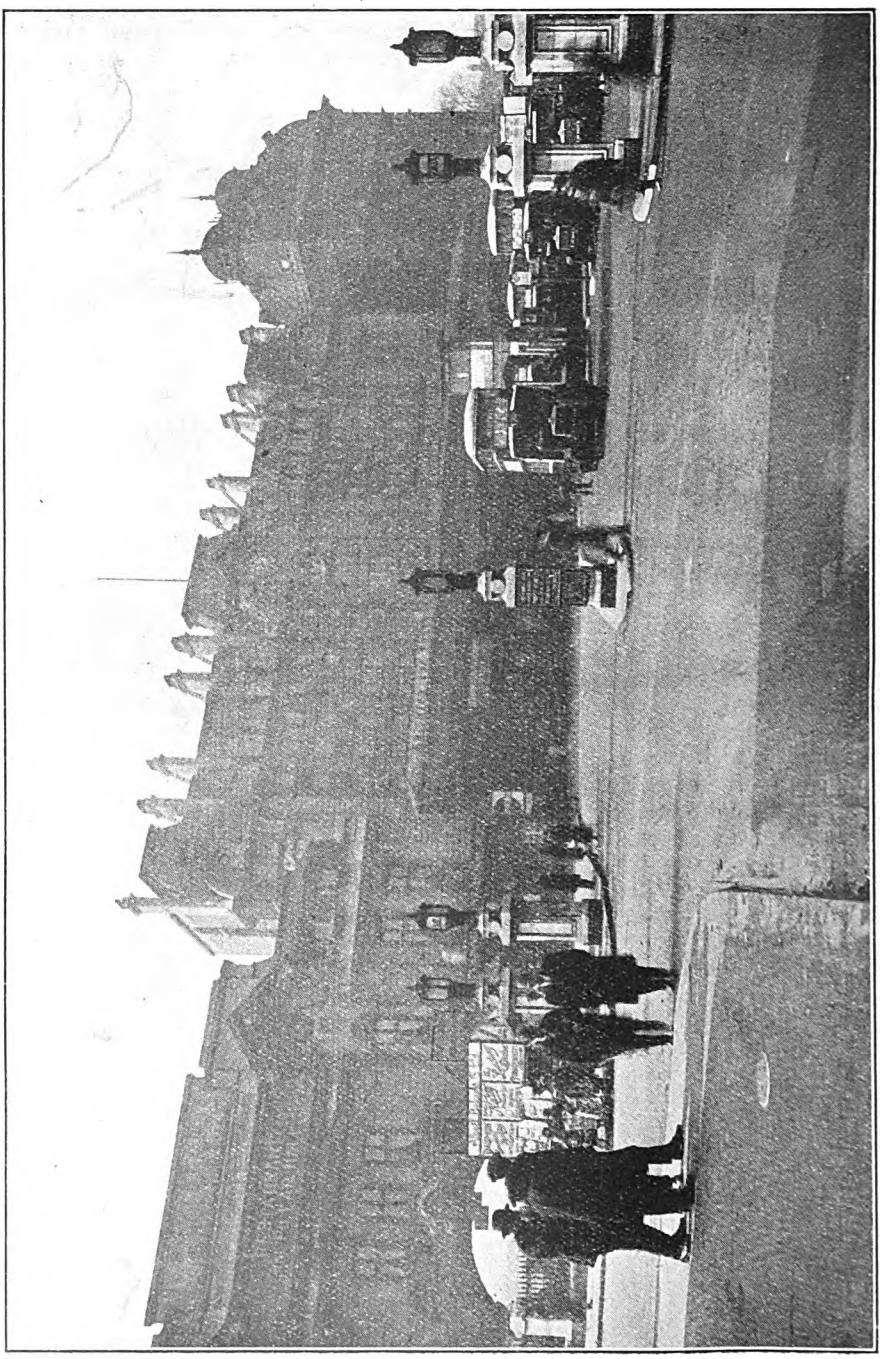

Photo.] GENERAL VIEW OF VICTORIA STATION (BOTH SECTIONS), SOUTHERN RAILWAY. [*Topical.*
Showing new L.G.O.C. Omnibus Station.

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Continental Luggage Stores at Victoria Station, Southern Railway.

FOR some time past it has been realised that the accommodation in the eastern section of Victoria station for dealing with luggage arriving by Continental trains and requiring to be stored until collected was inadequate. In order to meet requirements, new Customs storage premises, located under the Central section station, have been brought into use. This development was briefly described in Mr. J. F. Gairns' article on Victoria Station published last month.

The new premises utilise portions of subways and other space provided when the Brighton station was reconstructed some twenty years ago, but hitherto unused. These consist of a long subway, which has been continued through the old boundary wall to a point under No. 8 platform in the Eastern section. At this point a hatch has been constructed, from which a conveyor leads downwards on an incline to the required level and continues horizontally through the subway to the further side of the Central section station. At this end a spacious examination room is provided, reached by a public stairway adjacent to the cab exit to Buckingham Palace Road, and opposite the end of No. 16 platform. At right angles to the conveyor a long chamber is also provided, with benches along each side, whereon luggage waiting to be called for is placed. The arrangement is generally that, after luggage has been unloaded from arriving Continental trains in the eastern section station, luggage not taken away at once by passengers is placed upon the conveyor and thus transferred to the other side of the station. There it is placed by porters on the benches in the appropriate sections, so that, when called for, it can at once be placed upon the Customs examination benches.

The conveyor has a total length of over 200 ft., will carry packages up to about 2½ cwt., and can handle about 360 such packages per hour. It travels at a speed at which luggage conveyed by it can be dealt with conveniently. After the arrival of a train at No. 8 platform, and as soon as luggage which receives immediate Customs attention has been cleared, the hatch is opened and the conveyor started, so that remaining luggage is taken away to store. The hatch has a balanced iron cover and is very conveniently manipulated. When closed, too, it lies flat, so that there is no interference with platform work. When open it takes up an inclined position, allowing sufficient space for passing luggage to the conveyor or for the staff to make their way down a narrow staircase alongside it if they require to pass into the subway. For a short distance the conveyor is inclined, for which reason a number of conveyor slats are ribbed to prevent luggage sliding forward. For the remainder of its length the conveyor is horizontal, and at the further end luggage passes on to a slope from whence items are barrowed or conveyed by porters to the storage benches. The latter bear indicating letters, so that normally luggage is placed under a letter indicating the town of origin, though items also bear the reference numbers placed upon Continental luggage at Dover, as well as owner's identification marks, addresses, &c. The indicators consist of letter boards having two inclined faces, so that they can be seen in both directions. A side bay adjoining the storage hall is generally allocated for Paris luggage. There is sufficient storage space for over 1,000 items simultaneously without piling.

The Customs hall has the usual low benches for examination, together with accommodation for the Customs staff. For dealing with heavy luggage, an automatic electric hoist is provided connecting the examination hall with station level above. There is also a small hoist leading directly into a room which has been allocated for silk goods which require examination by daylight. This room opens directly upon the circulating space alongside No. 15 platform, and adjacent to the parcels and cloak-room premises. An interesting feature about the conveyor is that, before it is put into operation, a warning bell rings for nine seconds, so that the staff are fully advised that it is going to operate. Before the conveyor starts again after such a stop, the bell

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LUGGAGE BEING PLACED ON NEW CONVEYOR AT CONTINENTAL ARRIVAL PLATFORM.

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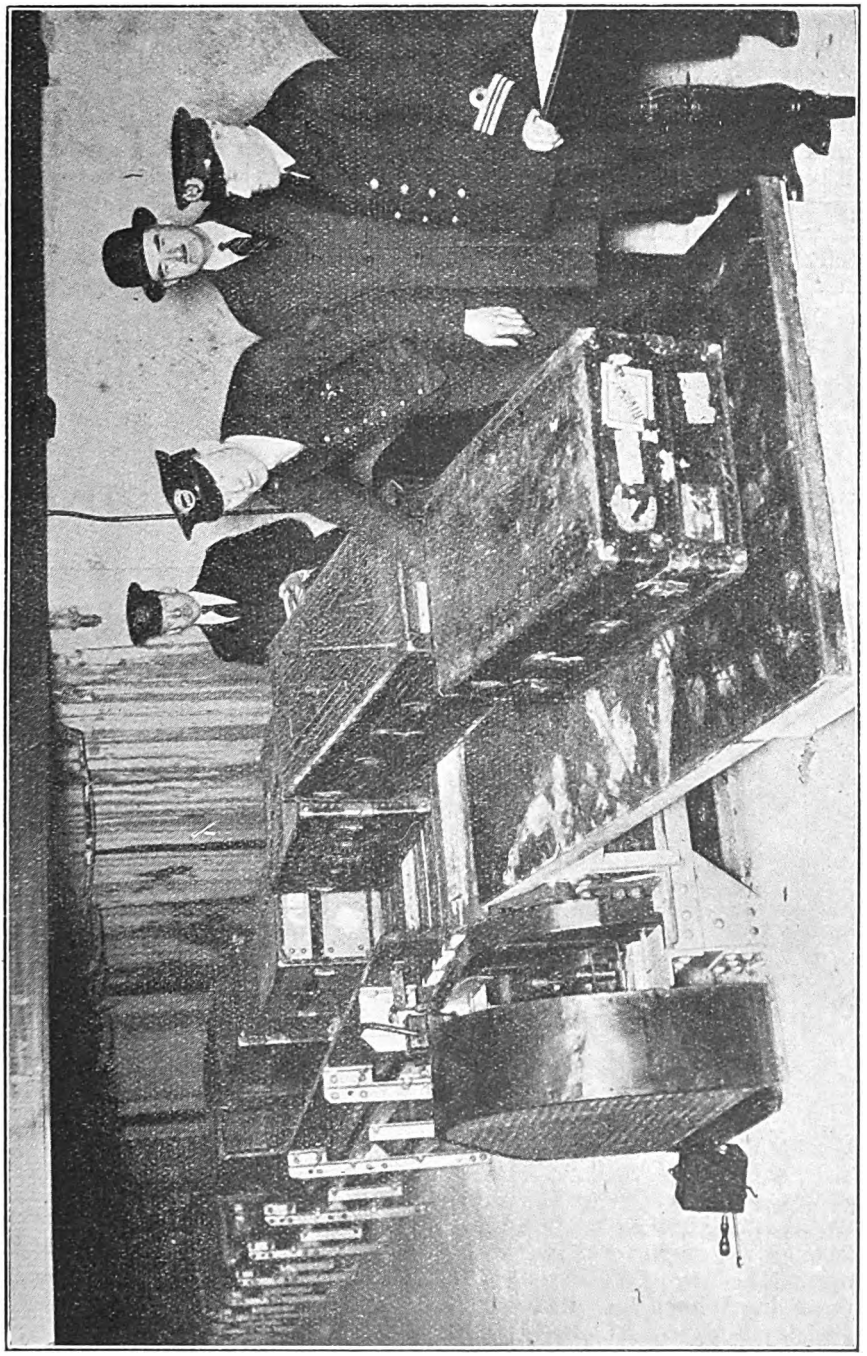

Photos.] LUGGAGE ARRIVING AT NEW CUSTOMS HALL ON THE ELECTRIC CONVEYOR. [*Topical.*

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sounds again for nine seconds. The conveyor was constructed by Fraser & Chalmers, while the driving electric motor and the control and adjusting gear are of General Electric manufacture. The hoists are of Waygood-Otis automatic type.

The new accommodation will be of great benefit to passengers arriving from the Continent by the last train at night, as they will be able to call (or send) at their own convenience, and have their luggage examined at any time between 6 a.m. and 12 midnight. A Customs officer is in attendance at all times between these hours.

Further improvements for dealing with the Continental traffic at Victoria include the installation of two new weighing machines in the baggage hall, on the eastern side of the station, while work has already been started on the enlargement of this room in order to give more space for handling and weighing passengers' luggage.

A photograph is also reproduced showing a general view of the two sections of Victoria Station with the omnibus station in the courtyard in full operation. Owing to work in front of the station this view could not be taken in time for last month's article.

THREE INTERESTING MODEL LOCOMOTIVES.

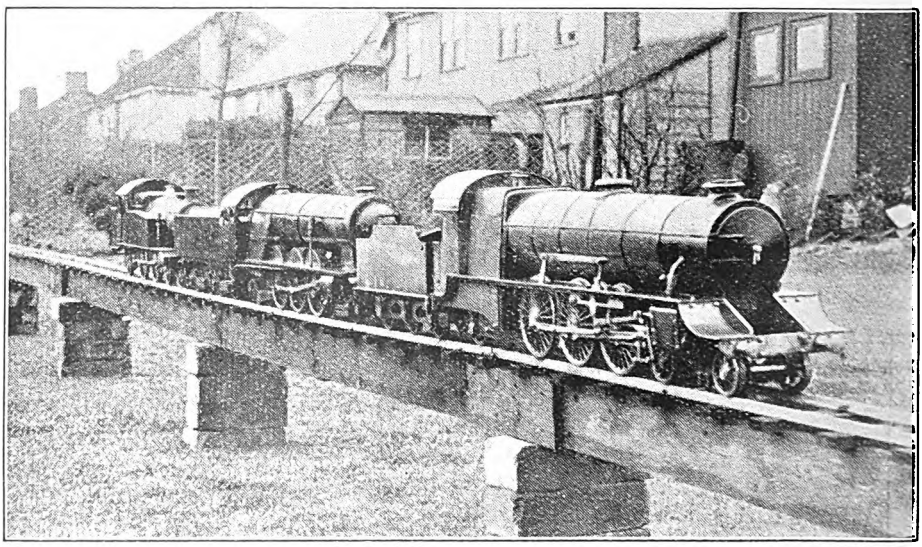

Photo.] [*A. J. Temple.*

A VIEW is reproduced showing three model locomotives constructed by Mr. A. J. Temple. The two "Pacifics" were in steam on the Wimbledon and District Model Railway Club's stand at the recent Wimbledon Exhibition of Arts and Handicrafts. Mr. Temple explains that the three engines illustrated are the result of five years' spare time work. They are all built to the 3½ in. gauge and are coal burners. That in the centre is his first attempt, though it has proved very successful as regards steaming and power. His second engine is the 4-4-2 tank locomotive, while the leading engine illustrated is his third. This engine is generally of "King Arthur" class, but has a wide firebox and the 4-6-2 wheel arrangement.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

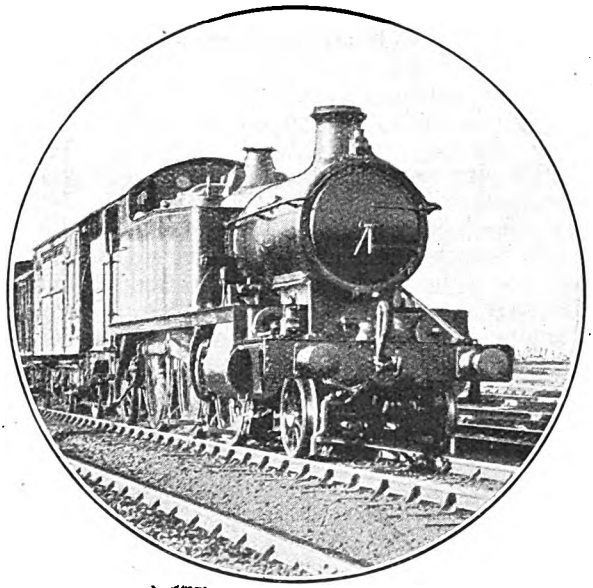

Photo.] [*M. W. Earley.*

2-6-2T No. 3128 ON TRAIN LEAVING OXFORD, G.W.R.

A SHORT time ago a Northern reader sought some information from me in regard to the working of oil-firing equipment on locomotives. His interest in the matter was the more intimate in view of his having undertaken volunteer locomotive driving during the troubles of last year, when he appreciated to the full the labour which falls on the fireman during lengthy continuous runs with coal-fired engines. The particular points on which he desired enlightenment were, first of all, as to the nature of the apparatus employed; then as to whether the fuel is pump-fed or gravity-fed to the burner, whether it is strained and also whether heated before use, and, if so, by what means; and, further, as to what is done with the burner when the engine is descending long gradients, standing or shunting—that is to say, if the burner is turned off in such conditions, and, if so, how it is re-ignited when the fuel is once again turned on. A minor but important point raised was in regard to the construction of the fire-grate, in which connection my correspondent enquired if solid castings are substituted for the usual fire-bars, and whether the air necessary for combustion is introduced through the usual dampers or through the burner itself.

To supplement my own limited information on the subject, in my own turn I have made enquiry of a well-informed friend who had a good deal to do with the extensive installation of oil-fuel equipment on L.M.S. locomotives during the coal dispute, and who has both observed the working of the engines concerned and driven them himself. He has most kindly sent me a complete exposition of the subject, and I cannot do better, therefore, than quote his letter in full. "The oil is stored in two cylindrical tanks mounted on the tender," he writes, "and these are filled on top from an overhead pipe through a gauze filter, much in the same way as the water tank is filled. The oil passes from the bottom end of the tank by gravity to a main valve on the tender front, which is secured by a padlock and key when the engine is in the shed.

"From here the oil travels underneath the footplate boards and fall-plate through a flexible rubber hose, protected with metal bands where it passes through the back angle-plate of the footplate, and so to the regulating valve under the footplate. This is operated by a long spindle passing through the footplate boards, and handle conveniently placed for the fireman. The handle has a pointer working round a graduated segment, so that the fireman can make careful adjustments of the oil-feed. Too often, alas! what should be

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'nice' adjustments are made with hefty blows from a spanner, and the result is a loathsome defilement of the countryside with black smoke. From the regulating valve the oil passes through another flexible pipe to the burner. This is fixed to a plate which replaces the lower half of the fire-hole door, and is directed downwards into the firebox. As the burner is well below the level of the storage tanks, the feed is entirely by gravity; such straining as takes place has been mentioned already, and the oil used is not heavy enough to require heating to induce a more rapid flow. A heavy, viscous oil would be quite unsuitable for the purpose.

"The burner is a brass casting with a detachable lip containing two passages, which open at the face in the shape of rectangular slits, one above the other. The lower one is a very narrow slit, generally 3½ in., but occasionally as much as 4 in. long; of this the lower portion is detachable to permit of accurate machining. Through this lower slit a thin fan-shaped jet of steam, drawn through a copper pipe from the carriage-warming outlet of the combination clack-box, is projected into the firebox. The quantity of steam used can also be regulated by a valve in the pipe just referred to, operated by a small hand-wheel. From the upper of the two slits oil drops slowly on to the 'fan' of the steam-jet and is instantly atomised. It ignites about 18 in. away from the burner, forming a long and intensely hot fan-shaped flame.

"It will be readily apparent that the direction of the jet is a matter of most vital importance; it is regulated by appropriate adjustment of the burner, which is hinged and can be tilted up and down. When I made trial runs with these engines, it was my duty to adjust the burner to the right angle and to seal the adjusting nuts. This had to be done while the engine was running, as the blast lifts the flame appreciably. The adjustment involved crouching on hands and knees on a rocking engine, at speeds often as high as 75 miles an hour, staring into the furnace to see at what point the flame struck the throat-plate. The right position is about two-thirds of the way up from the bars to the underside of the brick arch. If the jet is too high, the brick arch will be ruined, and, in any case, there is generally trouble after a time through the fusing of the brick. Too low a jet will probably melt the fire-bars. Despite this concentration of heat at the front of the firebox, the back corners remain comparatively cold, and this is

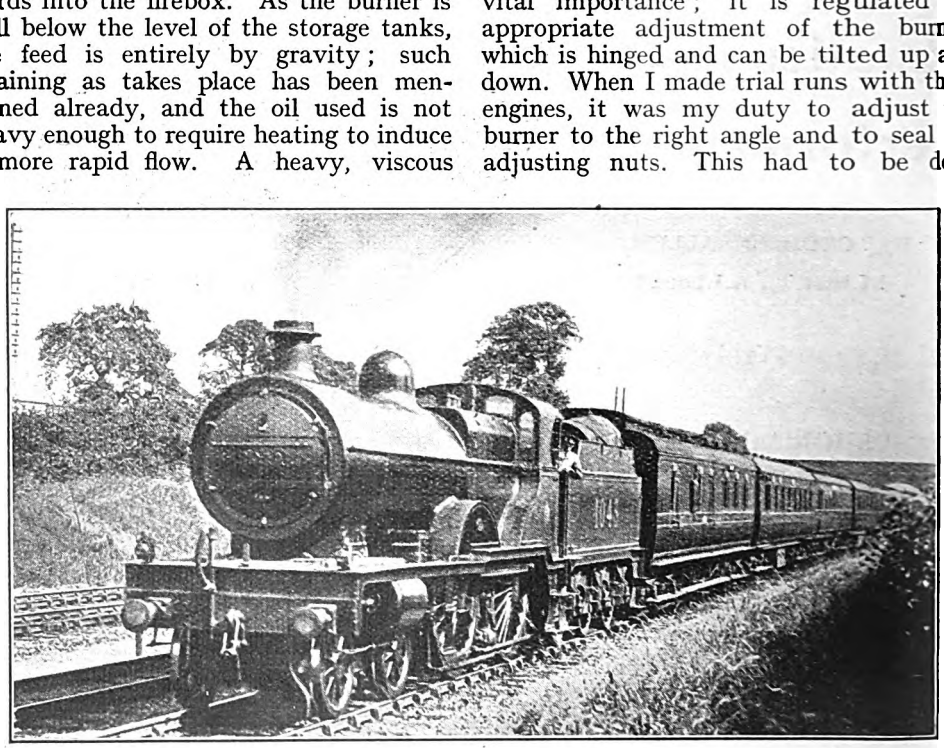

Photo.] **4.25 P.M. DOWN MANCHESTER EXPRESS, MIDLAND DIVISION, L.M.S.R.** [*F. R. Hebron.*

Oil-burning compound 4-4-0 No. 1043.

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the most objectionable feature of the system.

"As regards the general arrangements in the firebox, the fire-bars are untouched, but the grate is covered with a layer of broken brick, 3 or 4 in. thick, the lumps being about the size of a man's fist. The only omission is that of the baffle-plate or 'smoke-plate.' Air is drawn through the firebox, therefore, by the blast, in the usual way, and is controlled by the dampers. The broken brick becomes white-hot while the burner is in operation, and retains a considerable amount of heat when it is turned off; but if the engine is standing or coasting for any considerable time, logs of wood are thrown on to the grate. These are stored ready on the tender, in the small space in front of the oil tanks. In normal running, the oil-valve should be opened as far as possible without producing smoke at the chimney. When the engine is coasting, the valve can be partially closed, as previously mentioned, but is usually shut off. In starting the burner, it is customary first to turn on the steam jet and then the oil, ignition taking place with a mild explosion."

For this lucid exposition I am sure that every reader who is interested in the subject will be grateful to my friend, who has explained it in such detail. It only remains to add, for the benefit of those who are not *au fait* with the varied aspects of locomotive oil-firing, that the question is chiefly one of economics. In this country oil-firing originated with the Great Eastern Railway, who, having been debarred by the sanitary authorities from turning the residue of oil-gas manufacture into one of the local streams at Stratford, had to cast about for some means of putting it to good use. So the Holden burner was devised, and proved so successful with the express engines, that the demand for fuel began to outstrip the supply. Russian oils and Borneo petroleum were therefore purchased, in order to fuel between 50 and 60 express engines, which had been equipped for the purpose.

Photo.] [*G. H. Marillier.*

DOWN MANCHESTER EXPRESS, MIDLAND SECTION, L.M.S.R.
Oil-burning compound 4-4-0 No. 1100.

In the early years of the present century, however, the increasing demand for petrol, as well as the increasing uses of fuel oil, forced the price up to the point when oil-firing was no longer as economical as coal-firing. The burners were, therefore, removed from the Great Eastern engines, and the oil-tanks from the tenders, and a reversion to coal firing ensued. Despite the unfailing regularity with which our

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newspapers gravely inform us that a "new era has dawned," when they hear of the equipment of engines for oil-firing during each successive coal dispute, it is only when coal is either unobtainable or what is obtainable is unusable, that oil-firing becomes economically possible; at the beginning of the dispute, the oil-firing equipment is easily installed, and at the end it is just as quickly removed. Locomotive oil-firing, indeed, is never likely to make much headway unless there is an oil supply indigenous to the country concerned, or oil is much cheaper and easier to purchase than coal.

allotted the 5.15 p.m. from Bristol to Paddington (I wish I had known this, as it must have proved considerably the hardest of 1047's duties), and the 10.10 p.m. down mail back to Bristol. In the third week, from Tuesday to Friday, the trains taken were the 2.20 p.m. from Bristol to Birmingham, and the 6.35 p.m. from Birmingham to Bristol, as I mentioned, but the Plymouth week (8.45 a.m. Bristol to Plymouth and 1.45 p.m. back) never eventuated, as, owing to shortage of engine power at her home shed, the engine was wired for and had to return before completing the trials. My correspondent,

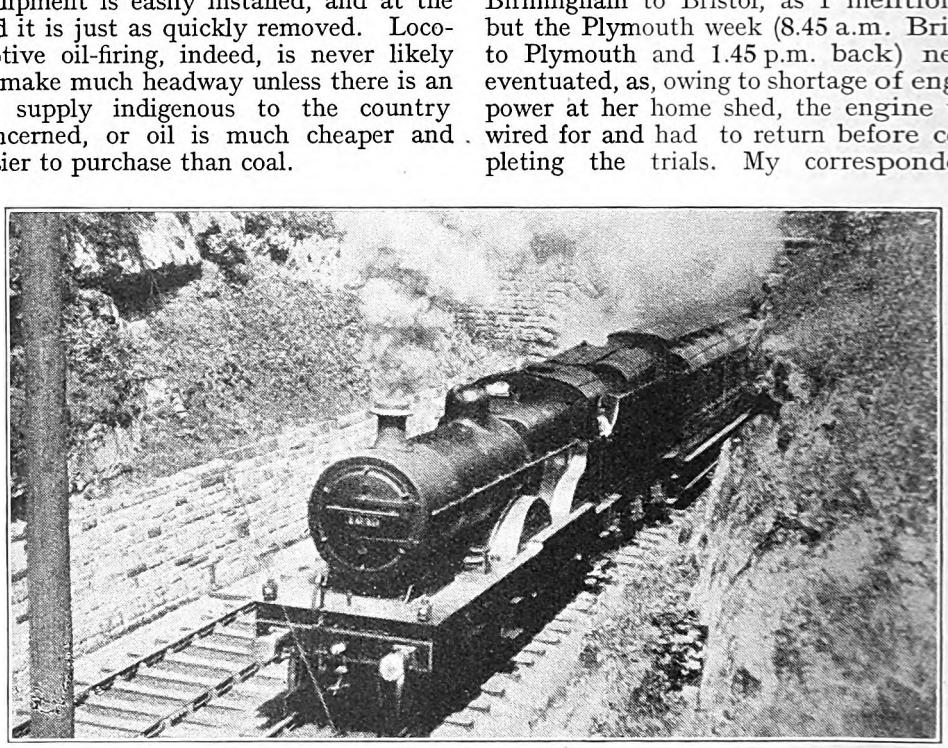

Photo.] [*W. Leslie Good.*

L.M.S.R. 4-4-0 COMPOUND LOCOMOTIVE No. 1049 (OIL-FIRED) ON TRAIN LEAVING COFTON TUNNEL.

Later on, in the present article, I give some details of running with oil-fired engines, but meanwhile there are one or two other matters that I want to mention, arising out of recent correspondence. First of all, in connection with the L.M.S.—G.W. locomotive exchange, a letter from Bristol informs me that I fell into a slight error in describing the movements of the Midland compound No. 1047 on the Great Western system. It appears that in the first week of the trials, from Tuesday to Saturday, she worked the 9.15 a.m. from Bristol to Paddington, returning with the 1.15 p.m. two-hour express, as described by me in March. From Tuesday to Saturday of the second week she was

who is well-informed on the matter, concludes "The general opinion here was that No. 1047 did very well, but the coal was bad and did not give her a fair chance; it was probably the chief reason of the Saturday failure to which you referred."

Also in connection with the exchange I have received a letter from Lord Monkswell, which I will reproduce in full. "It has been freely stated," he writes, "that the L.M.S. authorities had got out designs for some large four-cylinder compound 4-6-2 engines embodying all the principal features of the latest Continental designs, but that the intention to build such machines has been finally abandoned in consequence of the performance of a

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G.W. 'Castle' class locomotive on the L.M.S. main line. In these circumstances it may be of interest to compare the work of the G.W. engine, as described in THE RAILWAY MAGAZINE, with that of one of the four-cylinder compound locomotives of the latest type on the Chemin de Fer du Nord.

"The greatest effort of the G.W. engine that I can find, in examining the figures given in your March article, was up the 7-mile bank at 1 in 125 between Penrith and Shap. Figures are not given to show the average speed over this 7 miles, but the bank was begun at about 60 m.p.h., and speed had fallen to 36 m.p.h. at the top. The train weighed 415 tons, engine 80 tons, and tender about 45 tons, say 540 tons in all. Assuming that speed was constant after it had fallen to 36 m.p.h., the resistance per ton of train was then 18 lb., due to gravity and 7½ lb. due to velocity (in accordance with the familiar Deeley formula : $R = 3 + \frac{v^2}{290}$) ; the horse-power developed by the engine was therefore about 1,325.

"On the Nord the Caffiers bank is, for trains starting from Calais, almost exactly similar to that part of the ascent from Carlisle to Shap Summit which is under consideration. There are 7 miles continuously at 1 in 125. I was on the footplate of Nord 4-6-0 engine No. 3.1213, when she was working a train of 581 tons up this bank. Various slightly different figures of the weight of these engines and their tenders have been published, but 97 tons for the engine and 64 tons for the tender are the latest I have seen, so I adopt them. This gives a total moving weight of approximately 740 British tons. At the foot of the bank speed was approximately 52 m.p.h., and the last kilometre before the summit was run in exactly 56 seconds, or at practically 40 m.p.h. The exact figure was 39·94 m.p.h. Again, assuming that the speed was constant and calculating the resistance due to velocity from the Deeley formula, the result works out at 8½ lb. per ton ; the resistance due to gravity was again 18 lb., so the total resistance per ton was 26½ lb. This gives a horse-power of about 2,050. It must be mentioned that, although the reversing gear for both cylinders was almost in full gear, the steaming was absolutely perfect. Pressure was almost exactly at blowing-off point throughout

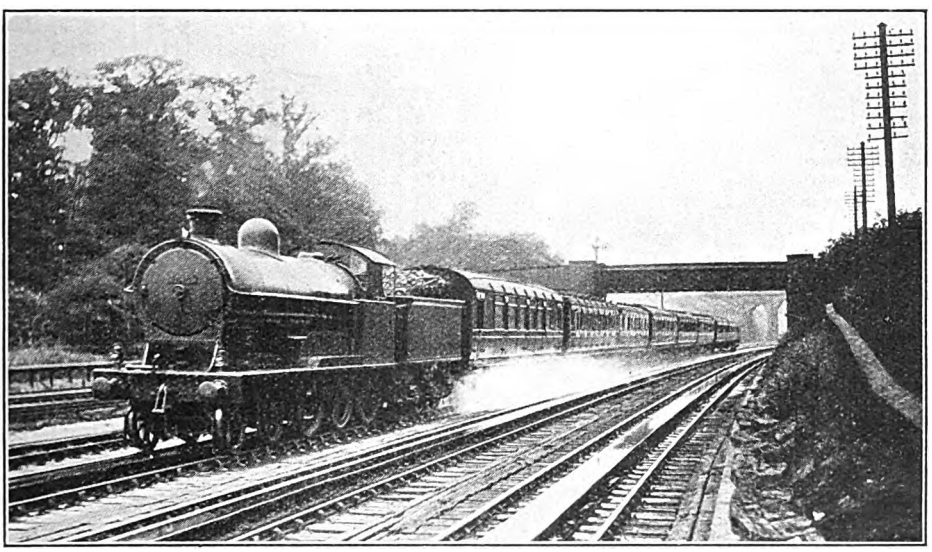

Photo.] [*H. Gordon Tidey.*

UP MANCHESTER EXPRESS ON BUSHEY TROUGHS, L.N.W. SECTION, L.M.S.R.

L.N.W. section 4-6-0 No. 5692.

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L.M.S. (MIDLAND DIVISION): 11.15 A.M. NOTTINGHAM—ST. PANCRAS.

Engine No.*		1082	1055	1093
,, Type		†3-cyl. 4-4-0	†3-cyl. 4-4-0	‡4-cyl.4-6-0
,, fired by		Coal	Oil	Coal
Load, tons tare/tons full		247/260	224/240	202/215

Distance.	——	Sched.	Actual.	Speeds.	Actual.	Speeds.	Actual.	Speeds.
Miles.		min.	m. s.	m.p.h.	m. s.	m.p.h.	m. s.	m.p.h.
0·0	Nottingham	0	0 00	—	0 00	—	0 00	—
2·8	Edwalton	—	5 40	48½	5 35	49	5 10	47
5·4	Plumtree	—	8 40	52½	8 35	52½	8 20	50
8·3	Widmerpool	—	12 10	51	12 00	52½	12 00	46½
10·9	Upper Broughton	—	15 10	61	14 55	62½	15 25	55
12·1	Old Dalby	—	16 30	57	16 10	55½	16 50	—
14·3	Grimston	—	18 45	72½	18 25	71½	19 25	60
17·6	Melton Junction*	—	slack	58	slack	50	slack	40
18·1	Melton	24	22 20	—	22 10	—	23 45	—
22·0	Saxby	—	26 40	57½	26 15	55½	28 40	—
24·3	Whissendine	—	29 05	58½	28 50	57	31 40	—
26·6	Ashwell	—	31 25	58½	31 25	—	34 30	47
29·7	Oakham	—	34 25	—	34 50	—	38 15	—
33·4	Manton	40	37 30	74	38 20	—	41 35	71½
38·6	Harringworth	—	41 50	79	43 05	71½	46 05	75
40·5	Gretton	—	43 35	60	45 05	—	48 00	—
					sigs.	30		
44·0	Weldon	—	47 35	51	49 50	—	52 15	49
46·5	Geddington	—	50 10	68	53 00	—	55 00	—
48·9	Glendon Junction*	—	slack	50	slack	50	eased	62
51·5	Kettering	60	55 30	60	58 20	—	59 50	—
52·8	Kettering South Junction*	—	sigs.	20	sig. stop	0	slack	35
54·2	Isham	—	60 20	—	63 30	—	63 30	—
			sigs.	25	sigs.	30		
58·5	Wellingborough	67	65 15	—	68 45	—	67 55	64½
			sigs.	35				
60·8	Irchester	—	68 35	—	71 25	—	70 20	—
63·8	Mile-post 59¾	74	72 40	—	75 20	42½	74 00	41½
66·8	Sharnbrook	—	75 45	79	78 20	83½	77 05	77½
70·6	Oakley	—	78 50	63	81 15	67	80 10	—
							sigs.	50
73·8	Bedford	83	81 40	72½	83 55	74	83 15	—
81·8	Ampthill	—	89 25	56½	91 30	55	92 55	46
83·3	Flitwick	—	90 55	64½	93 10	60	94 45	—
86·2	Harlington	—	93 40	—	96 20	53½	98 05	—
89·5	Mile-post 34	—	sigs.	20	—	50	—	50
90·7	Leagrave	—	100 55	—	101 45	—	103 20	—
93·3	Luton	105	103 25	—	104 10	67	105 45	64
96·3	Chiltern Green	—	106 10	74	107 00	71½	108 35	—
98·9	Harpenden	—	108 30	—	109 30	—	111 05	—
103·6	St. Albans	115	112 30	—	113 35	—	115 35	—
108·3	Radlett	—	116 00	86½	117 25	77½	119 25	77½
			sigs.	30				
111·1	Elstree	—	119 10	—	120 00	60	122 10	56½
114·2	Mill Hill	—	122 50	—	122 45	—	125 00	—
116·6	Hendon	127	124 45	76½	124 40	77½	126 55	77½
120·0	Finchley Road	—	128 20	—	128 15	—	130 20	—
—	Haverstock Hill*	—	slack	40	slack	35	slack	45
122·0	Kentish Town	133	130 55	—	130 55	—	132 40	—
123·5	St. Pancras	126	133 25	—	133 25	—	135 05	—

* Service slack. † Compound. ‡ Simple, "Claughton" class (named *Sir Guy Calthrop*).

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the ascent, and to all appearances the boiler could even have supplied the steam required by bigger cylinders.

"If an allowance proportionate to the greater weight of the Nord engine be added to the horse-power developed by the Great Western engine, the result in the latter case works out at about 1,650. On the basis of a comparison between the work performed by the two engines on the occasions in question, therefore, the Great Western design cannot be regarded as a serious rival of the Nord design."

Conversely, with all regard to the distinguished writer of this letter, I cannot regard this as altogether a fair comparison. I was at considerable pains in my March article to prove that Driver Young was deliberately refraining from spectacular work, when working *Launceston Castle* over the L.M.S. main line, in order to keep his coal consumption at as moderate a level as possible. Even if he had kept bare schedule times, such a course would have been justifiable, but as he had time well in hand on all runs, it was even more so. On the run to which Lord Monkswell refers, Young had gained 7½ min. to Shap Summit, and could hardly have been expected to exert his engine any further, though from the recorded work of the "Castles" his ascent by no means expressed the limit of the engine's powers.

It would be interesting to know, indeed, if, in regard to continuously developed horse-power, it would equal the feat of working 505 tons up the 15 miles from Bletchley to Tring, mostly adverse at 1 in 330, in 15 min. 10 sec., at a rate sustained for the major part of the distance at over 60 m.p.h., and only falling on the final stage to 52½ an hour. Lord Monkswell remarks that the Nord engine was working at practically full cut-off in all cylinders, to achieve the summit speed that he noted; it is tolerably certain that, save on starting, the Great Western engine was never so worked throughout the exchange trials, or, indeed, at anywhere near such a position. As regard the relative difficulty of the two schedules, of course, the demands of the Nord schedule mentioned far and away exceed those of the booking to which *Launceston Castle* was working; but that is not the point at issue. To my mind what is needed to complete Lord Monkswell's comparison is the figure for fuel consumed per indicated horse-power-hour in achieving the two feats to which he draws attention; without this the comparison is vitiated.

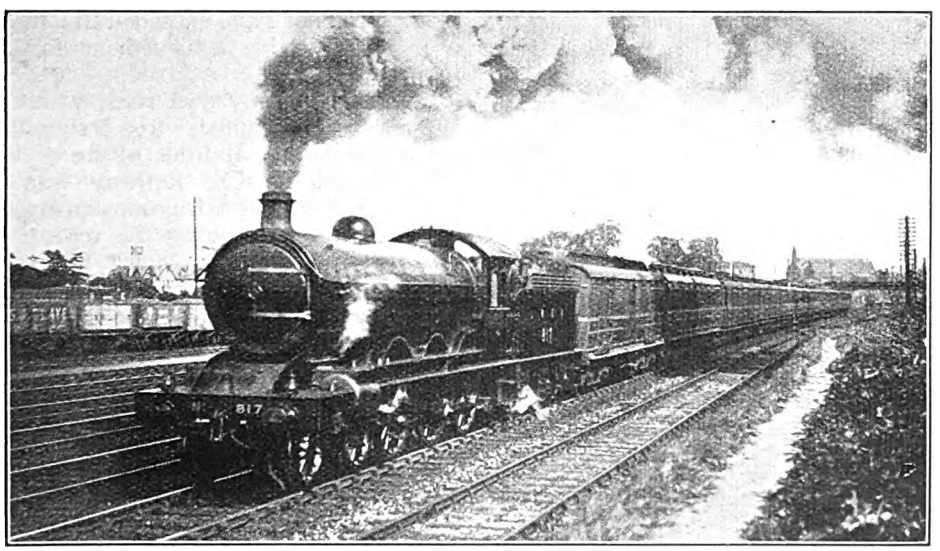

Photo.] [*Henry L. Salmon.*

NEWCASTLE—KING'S CROSS RESTAURANT CAR EXPRESS, NEAR YORK, L.N.E.R.

N.E. section class S2 4-6-0 No. 817.

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There is one last letter which has a bearing on the question of small driving wheels, mentioned last month. It encloses a run with one of the 5 ft. 2 in. Great Western 2-4-0 tank engines which, although well over thirty years old, still

L.M.S. (WESTERN DIVISION).

11.25 A.M. BIRMINGHAM—EUSTON.

Engine: 2-Cyl. 4-6-0 "Prince," No. 5678, *Milton*.

Load: 36 axles, 256 tons tare, 270 tons full.

Distance.	——	Schd.	Actual.	Speeds.
Miles.		min.	min. sec.	m.p.h.
0·0	Birmingham	0	0 00	—
1·9	Adderley Pk.	—	3 35	—
3·8	Stechford ..	—	5 40	60
6·5	Marston Green	—	8 10	—
10·1	Hampton ..	—	11 25	70½
			sigs.	28
13·4	Berkeswell ..	—	15 00	—
15·4	Tile Hill ..	—	17 55	—
18·9	Coventry ..	20	22 15	—
4·9	Brandon ..	—	6 25	68
10·8	Rugby No. 7	—	12 05	*45
11·4	Rugby ..	13	12 55	*45
			p.w.s.	30
18·7	Welton ..	—	22 55	—
24·2	Weedon ..	—	27 50	71½
31·1	Blisworth ..	33	33 50	—
34·1	Roade ..	36	36 45	60
39·2	Castlethorpe	—	41 00	79
41·5	Wolverton ..	—	42 45	—
47·3	Bletchley ..	49	47 40	68
53·8	Leighton ..	—	53 45	64
57·9	Cheddington	—	57 35	60
62·3	Tring ..	65	62 05	57½
			sigs.	25
66·0	Berkhamsted	—	66 45	—
69·5	Boxmoor ..	—	70 20	66
73·0	King's Langley	—	73 20	74
76·5	Watford ..	79	76 10	74
78·0	Bushey ..	—	77 25	70½
80·7	Hatch End ..	—	79 45	69
82·6	Harrow ..	—	81 20	71½
85·9	Wembley ..	—	83 55	76½
			sigs.	20
88·6	Willesden Jc.	90	87 45	—
			sigs.	20
94·0	Euston ..	98	95 45	—

* Service slack.

perform such doughty deeds on the London suburban services. The train was the 4·33 p.m. from Paddington to Slough, and the engine No. 3599, with a tare load of 129 tons, and a gross load, probably, of 140 tons, or slightly over, the stock being non-corridor. Westbourne Park, 1·3 miles, was passed in 2 min. 55 sec., but then came a severe p.w. check over the engineering works now in progress. So it took 9 min. 55 sec. to get through Ealing Broadway, but the engine was now doing 52½ m.p.h., and increased the speed to 59 by Southall, and a sustained 60 from Hayes to Langley. Southall, 9·1 miles, was passed in 13 min. 26 sec., West Drayton, 13·3 miles, in 17 min. 35 sec., and Langley, 16·2 miles, in 20 min. 35 sec., the 10·4 miles from Ealing having been run in 10 min. 40 sec. Slough was reached in 23 min. 8 sec. for the 18·5 miles, or in a net time which in my judgment could not have exceeded 21½ min.—a most creditable achievement for this little veteran.

And now for my own runs, which, as previously mentioned, are designed to illustrate the possibilities of firing with oil-fuel. The L.M.S. Railway was the only one of the British groups to use oil-firing extensively during the recent coal dispute, and the runs which follow are therefore confined to that system. I will begin with three on the 11.15 a.m. non-stop 2¼-hour express (actually allowed 136 min.) from Nottingham to St. Pancras, the first of them being without question the finest I have ever recorded on a long series of runs with that train, the second a journey behind an oil-fired compound with a load less by one coach, and the third the only record that I have secured of the performance of the Western Division "Claughton" *Sir Guy Calthrop*, when that engine was working experimentally over the Midland Division. The point that I wish to make is that the oil-fired compound, in the hands of that supremely competent driver, W. E. Poole, of Derby, gave a display but little inferior to that of the coal-fired No. 1082 (which was doing some extraordinary work at about that time), and certainly gave no evidence at any point of shortness of steam. No. 1082's run, I may add, was made well before the coal dispute, and therefore with coal of normal quality.

As there is plenty of space available in the table of these three runs, I have showed there the maximum and minimum speeds attained en route, so that the briefest of comments will suffice on the features of each journey. In this connec-

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tion let me remark, in answer to a recent query, that the figures I show in the "speeds" column are not *average* speeds from station to station, but *maximum and minimum* speeds at or near the stations opposite which they appear. That is to say, if the summit of an incline or the foot of a descent is either at or near any station in the table, the speed shown is the minimum or maximum respectively at the top or bottom of the gradient concerned; other speeds that are shown represent the speed of the train when passing the station concerned.

Engine No. 1082 had the exceptional load, for the Nottingham road (which is heavily graded), of eight 8-wheelers and one 12-wheeled "diner," or 260 tons all found. Up the 1 in 200 which extends to Widmerpool the start was brilliant, speed rising to 52½ m.p.h. on the mile of slightly easier grade through Edwalton, and falling back to 51 at the top. The very slight descent for less than a mile at Upper Broughton raised the rate above the "sixty" line, and the final 2 miles up at 1 in 220 did not bring us below 57 an hour. Then again the speed was finely maintained up the long ascent from Melton to Ashwell, mostly at between 1 in 274 and 299. A higher rate than usual was reached at Harringworth—all but 80 m.p.h., in fact—but speed was moderated to 60 over the curves between there and Gretton; the 5½ miles at 1 in 200 up to Weldon, including the threading of Corby Tunnel, were compassed at no lower minimum than 51 m.p.h.

After this tremendous initial energy, we joined the main line at Glendon Junction exactly abreast of the up Bradford express due in St. Pancras at 1.25 p.m. We were immediately involved in severe signal checks, and indeed, although the latter was a considerably lighter train than ours, it delayed us all the way up to town. Very high speeds were run by 1082 wherever opportunity offered, including the exceptional figure of 86½ m.p.h. before Radlett, and another brilliant effort was a minimum of 56½ m.p.h. up the 1 in 200 to Ampthill. Notwithstanding all delays, however, we completed the journey in 133 min. 25 sec., well inside booked time. I am not disinclined to think that this should have figured in my 200th article as my "best" over the Midland Division, in place of the run actually given; a net time of 124 min., as nearly as I can estimate, from Nottingham to St. Pancras, would take a lot of beating with a 260-ton train.

Driver Poole, with No. 1050, had one coach less, but the still quite respectable load, for this road and booking, of 240 tons.

L.M.S. (WESTERN DIVISION)

11.30 A.M. EUSTON—BIRMINGHAM.

Engine: Midland 3-Cyl. comp. 4-4-0 No. 1055.

Driver: F. Hayes, Camden Shed.

Load: 36 axles, 256 tons rate, 270 tons full.

Distance.	——	Schd.	Actual.	Speeds.
Miles.		min.	min. sec.	m.p.h.
0·0	Euston ..	0	0 00	—
5·4	Willesden Jc.	9	8 50	60
8·1	Wembley ..	—	11 25	62½
11·4	Harrow ..	—	14 40	60
13·3	Hatch End ..	—	16 35	58½
17·5	Watford ..	22	20 40	62½
21·0	King's Langley	—	24 00	62½
24·5	Boxmoor ..	—	27 30	58½
28·0	Berkhamsted	—	31 05	57½
31·7	Tring ..	37	34 55	57½
36·1	Cheddington	—	38 40	76½
40·2	Leighton ..	—	42 15	72½
46·7	Bletchley ..	51	47 30	70½
52·5	Wolverton ..	—	52 40	68
54·8	Castlethorpe	—	54 50	65
59·9	Roade ..	64	60 10	57
62·9	Blisworth ..	67	63 10	68
69·8	Weedon ..	—	69 15	70½
75·3	Welton ..	—	74 35	60
			p.w.s.	30
82·6	Rugby ..	87	83 50	—
89·1	Brandon ..	—	sig. stop	—
94·0	Coventry ..	100	104 50	—
3·5	Tile Hill ..	—	6 20	55½
5·5	Berkeswell ..	—	8 25	64½
8·8	Hampton ..	—	11 20	72½
12·4	Marston Green	—	14 20	72½
15·1	Stechford ..	—	16 45	68
17·0	Adderley Pk.	—	18 25	68
18·9	Birmingham	22	21 15	—

His start from Nottingham to Grimston was the fastest I have ever timed, the sustained speed of 52½ m.p.h. up the early 1 in 200 and the maximum of 62½ beyond Upper Broughton being notable indeed, and witnessing to the fact that oil-firing was occasioning no difficulties in the production of steam. Beyond Melton the engine was eased somewhat, and

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55½ sustained (a fine achievement) at mile-post 34, 68 at Luton, 77½ at Radlett and 50 at Elstree. The net non-stop time from Leicester to St. Pancras was about 103 min.

On the Western Division the best run I have noted with oil-fuel was on the 12.5 p.m. express from Manchester to Euston, during the period of its temporary deceleration, with No. 1620, a "Prince" 4-6-0, and a 44-axle train of 335 gross tons. From Stoke to Rugby, where a special stop was in force, we were badly delayed by signals, but although allowed 83 min. for the 63·3 miles' run, we covered the distance in 80 min. 55 sec., or 74 min. net. From Rugby to Willesden we ran the 77·2 miles in 81 min. 25 sec., or about 80½ min. net, allowing for a p.w. slowing below Wembley. Welton was passed in 12 min., Weedon in 17½ min., Roade in 27½ min., and Bletchley in 39 min. 40 sec., after which we ran the 15 miles up to Tring in 16¼ min., from Tring to Watford in 13 min. 25 sec., and Watford to Wembley in 10¼ min. Maximum and minimum speeds were 64½ m.p.h. at Weedon, 55½ at Roade, 72½ at Castlethorpe, 46 at Tring, and 71½ at King's Langley and Wembley. In no way was this a record run, but it was a sound demonstration of efficient steaming on oil fuel.

And now, in conclusion, I want to describe two remarkable runs of recent date on the L.M.S. Birmingham service. Neither has any connection with oil firing; one affords confirmation of my contention that the Midland compounds are equal to the maximum demands of the two-hour service, and the other is a witness to the striking speed capacity of the "Princes," which have lately been appearing on these trains, despite their driving wheels of only 6 ft. 3 in. diameter. Full details of the speeds in both directions appear in the logs reproduced.

Driver Hayes, of Camden, was the officiating genius on the down run. Scrutiny of the table will show that, with 270 tons, he ran the 26·3 miles from Willesden up to Tring in 26 min. 5 sec., at an *average* speed of 60·4 m.p.h., and it appeared from the running that the 57½ m.p.h. on the upper length of the 1 in 330 could have been maintained indefinitely. Then a time of 19 min. 55 sec. over the 23·1 miles from Tring to Castlethorpe brought us down practically to "even time" from Euston, while the unusually high speed from Blisworth to Weedon put the matter well beyond doubt. Welton, 75·3 miles from Euston, was passed in 74 min. 35 sec., the distance of all but 70 miles from Willesden having been covered in 65¾ min.

Very bad delays followed; the length of line between Brandon and Berkeswell inclusive is, in my recent experience, the bane of the Birmingham 2-hour trains, and it seems but seldom that one can traverse it without signal checks. Judged by my last previous run on the same train, these delays cost us 11¼ min., our net time from Euston to Coventry being 93¼ min., or 6¾ min. under schedule. A brilliant little run into Birmingham followed—the west-bound Coventry-Birmingham course is considerably harder than that in the reverse direction—only 21¼ min. being taken over the 18·9 miles. A particularly fine feat was the attainment of 56½ m.p.h. up the 1 in 330 from Coventry start to Beechwood Tunnel. Given the road, and no stop at Coventry, I am confident that Driver Hayes could have completed the 112·9 miles from Euston to Birmingham, with this 270-ton train, in 112 min., if not 111 min., and he has every reason to feel proud of such excellent running.

Of no less merit was the journey with the corresponding up train, identically loaded, but with the 66-ton 2-cylinder 4-6-0 "Prince" in place of the 60-ton 3-cylinder 4-4-0 compound. The two runs, indeed, provide the exact "foil" to each other. Despite four severe signal checks (Berkeswell was responsible for one of them) and a p.w. delay, yet *Milton's* driver, whose name, unfortunately, I omitted to ascertain, succeeded in keeping dead time from New Street to Euston, 2-minute stop at Coventry included. The chief features of the journey were the time of 14 min. 25 sec. for the 15 miles from Bletchley up to Tring, with speed still maintained at 60 m.p.h. through Cheddington, and only falling to 57½ at the summit of the 1 in 330; the minimum of 60 an hour at Roade; and the extraordinarily high maximum—for 6 ft. 3 in. wheels down nothing steeper than 1 in 330—of 79 at Castlethorpe. The rapid acceleration from the Berk-

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hamsted check is also worthy of note, and further high-speed running was involved in the time of 13 min. 35 sec. over the 16·4 miles from Boxmoor to Wembley.

The net time from Coventry to Euston, after allowing for all delays, I calculate at 90 min. for the 94 miles, start-to-stop, and the net time from Birmingham, had no stop been made at Coventry, certainly not more than 108 min. for the 112·9 miles, and possibly 107½ min. The difference between this figure and the net time of the down run roughly represents the difference in relative difficulty between the up and down journeys respectively, arising chiefly out of the widely-differing character of the two starts. It would be deeply interesting to know what were the total coal consumptions of the two engines in these exactly comparable running conditions.

During the month preceding final proof correction, I have received letters from the following :—Rev. P. A. Lushington, G. B. M. Adlam, R. Barker, F. W. Brewer, J. H. Capell, G. R. H. Deane, T. W. Dron, N. D. Ellis, E. J. Fasham, C. H. Frend, L. A. Garrard, H. J. J. Griffith, E. W. Maybank, R. D. N. Oldrey (Australia), W. J. Reynolds, J. D. Thomson, R. A. H. Weight, F. L. Wimhurst, M.C., "Sir Hervis de Revel" and "Exhaust." I am glad to add that the pseudonym of the last-mentioned does not appear to be expressive of his feelings after the perusal of my last contribution! To certain other correspondents direct replies have been sent, and on as many as possible of those communications referred to above comments will appear in forthcoming articles, though I fear it would need complete issues of this journal in which to deal with them all, or even to answer adequately a part of the interesting matters discussed.

BLACKPOOL-MANCHESTER CLUB TRAIN, L.M.S.R.

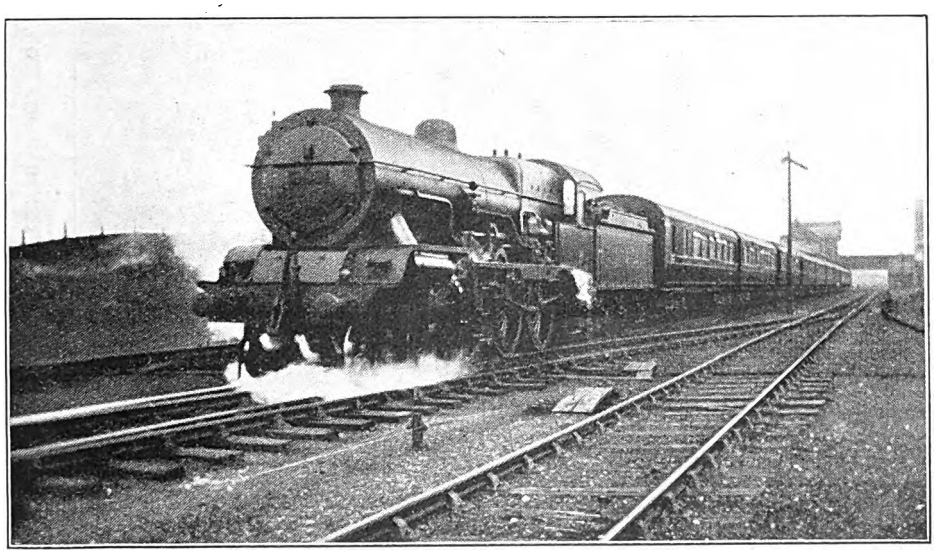

Photo.] [*R. Isherwood.*

The train is shown at Ainsdale Station. The locomotive, four-cylinder 4–6–0 No. 10434, is fitted with Dabeg feed-water heater and pump.

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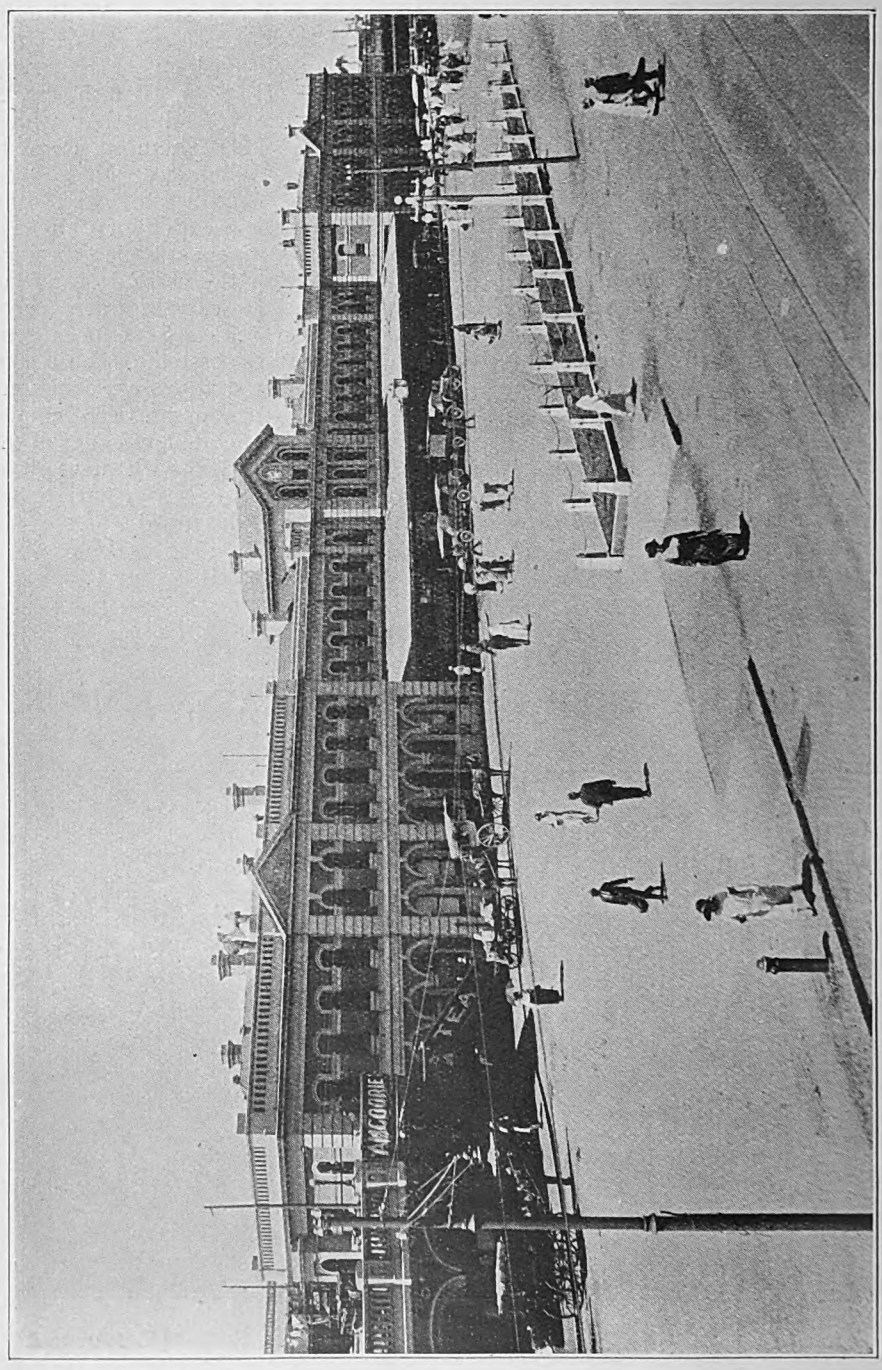

GENERAL VIEW OF PERTH CENTRAL STATION, HEADQUARTERS OF THE WESTERN AUSTRALIAN GOVERNMENT RAILWAYS.

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The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

VIII.—WESTERN AUSTRALIAN GOVERNMENT RAILWAYS.

THE railways of Western Australia comprise 3,733 miles of 3-ft. 6-in. gauge lines, and, as shown in the accompanying map, are well connected up within an arc of 300 miles from the capital city of Perth. Like the other Australian railways, however, the system includes long spurs into the interior; and of these the most distant are Meekatharra (600 miles), Sandstone (575 miles to the north-east) and Albany (341 miles to the south), while Laverton (some 200 miles north-east of Kalgoorlie) is 566 miles away from the headquarters of the railways. In addition to the Government lines, there is a privately owned railway called the Midland Railway of Western Australia, which operates 277 miles of 3-ft. 6-in. gauge line, while there are also 452 miles of the Commonwealth railways 4-ft. 8½-in. gauge track running east from Kalgoorlie to the South Australian border.

Western Australia is the largest State in the Commonwealth, but, with the exception of the Northern Territory and Tasmania, has the smallest population. The State comprises 975,920 square miles in area, which represents about eight times the size of the British Isles and is greater than the combined area of New South Wales, Victoria, South Australia, Tasmania, and New Zealand. The population, however, is less than 370,000 souls, or equal to 98 per mile of railway.

While Western Australia has had railway connection with the eastern States since 1917, when the transcontinental line between Kalgoorlie and Port Augusta was completed, she still occupies a somewhat isolated position. Owing to the mixture of gauges, she is badly handicapped in connection with inter-State traffic, as anything passing between the 3-ft. 6-in. gauge system of the west and the 5-ft. 3-in. gauge systems of South Australia and Victoria requires transhipment at three points—Kalgoorlie, Port Augusta, and Terowie. No other State is so unfortunately situated, and it must, therefore, be a matter of great satisfaction to the Western Australian Government and the Railways Commissioner that, primarily on the basis of production within the State, a profit of £190,565 was secured on working during the financial year 1924–25.

The principal ports served by the railway are Fremantle, Bunbury, Albany and Geraldton, while the main traffic depots are at Fremantle, Midland Junction, Northam, Collie, Narrogin and Kalgoorlie, the last-named being the connecting point with the trans-Australian line to South Australia. The principal traffics are coal, timber and grain—the latter, so far as wheat is concerned, having the high average haul of 142 miles. My recent tour in Western Australia, where I was afforded generous facilities by the Commissioner, coincided with the movement of heavy grain traffic to the ports, and I was very interested to notice the efficient way in which the traffic was handled on the line and at Fremantle, where the loading facilities are on a comprehensive basis. Large blocks of wheat traffic were seen at Narrogin, Wagin and Northam, these being the principal gathering grounds.

The methods of organisation in Western Australia are based upon a system which divides the service, roughly, into administration, engineering, and operation. The actual working units, although classified as branches, are virtually departments, with, however, certain variations from the ordinarily accepted form of departmental organisation. Briefly stated, there are six branches: management, mechanical engineering, other engineering, transportation, accountancy, and stores. There are six traffic, locomotive, and permanent way districts.

Whilst Western Australia is generally regarded as a gently undulating country, the fact remains that the ruling grades

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shunting, and 13 "M" class Garratt engines. Since then the 10 new "P" class 4-6-2 type express passenger engines, built by the North British Locomotive Co. Ltd., have been placed in traffic. These engines have a tractive power at 80 per cent. of 22,248 lb., against the 17,233 lb., which represented the highest capacity of the older class "E" passenger locomotives. General particulars of the two types are given. The new "P" class engines in traffic at the time of my visit were doing good work, and their use on the Kalgoorlie-Perth expresses was obviating the double-heading of the trains. They were also being found of great advantage in dealing with the heavy harvest traffic.

	Class "P" Engine.	Class "E" Engine.
Tractive power, 80 per cent.	22,248 lb.	17,233 lb.
Total weight in working trim (estimated)	97 tons 15 cwt.	83 tons 4 cwt.
Heating surface tubes	21—5¼ in. dia.—484 sq.ft.	284—1¾ in. dia.
	108—2 in. dia.—947 sq. ft.	1,294 sq. ft.
Heating surface firebox	125·5 sq. ft.	125·2 sq. ft.
Total heating surface	1,556·5 sq. ft.	1,420 sq. ft.
Superheater	363 sq. ft.	—
Grate area	35 sq. ft.	19 sq. ft.
Boiler pressure	160 lb.	175 lb.
Distance between tube-plates	16 ft. 9 in.	11 ft. 1 in.
Diameter of barrel (at smokebox)	4 ft. 6½ in.	4 ft. 9¾ in.
Water capacity	2,800 gallons	2,200 gallons.
Fuel	8 tons.	5 tons.
Rigid wheelbase	10 ft.	11 ft.
Diameter of driving wheels	4 ft. 6 in.	4 ft. 6 in.
Cylinders	19 × 26	17 × 23.

During the past twenty years or so 176 locomotives, with an average tractive power of 18,123 lb. each, have been added to the stock, while within the last two years strenuous efforts have been directed towards the general improvement of the locomotive position. Sixteen engines of obsolete design have been written off, while twenty 4-6-2 type locomotives have been reconstructed, and fitted with superheaters, to develop an average tractive power of 16,500 lb. each. Sixty other locomotives have also been superheated, and, as previously noted, ten powerful superheated "Pacific" type locomotives have been purchased. The execution of this work has greatly relieved the strain experienced in the harvest months when traffic is, naturally, most dense, and as the 30 new engines of two classes replace 59 of seven classes it will be appreciated that a big step forward has been taken towards uniformity.

At the close of the last financial year the rolling-stock comprised 482 passenger vehicles, 9,974 freight vehicles and 183 brake vans; 166 passenger cars and nearly 5,000 wagons have been added during the last 20 years. With few exceptions all the coaching stock comprises bogie vehicles of various types as required to meet the travel conditions in Western Australia, this including 51 sleeping cars, of which 16 are second-class. Western Australia and Queensland are the only States in the Commonwealth providing sleeping accommodation for second-class passengers, but it should be added that this is also provided on the trans-Australian line. New cars under construction include a type of country day car of an interesting design, while it is proposed to build a number of first-class corridor sleeping cars, each divided into nine two-berth compartments, fitted with toilet facilities and cabinet wardrobe.

There is nothing of special interest in the goods stock, except that, as compared with the other Australian lines, the number of cattle and sheep wagons is small. The stock includes 934 highside wagons of 15¾ tons average load capacity, and 310 of 20 tons capacity, 234 covered wagons of 15¾ tons capacity, 150 fruit vans of 17¼ tons capacity, and 238 rail and timber wagons. Cattle wagons

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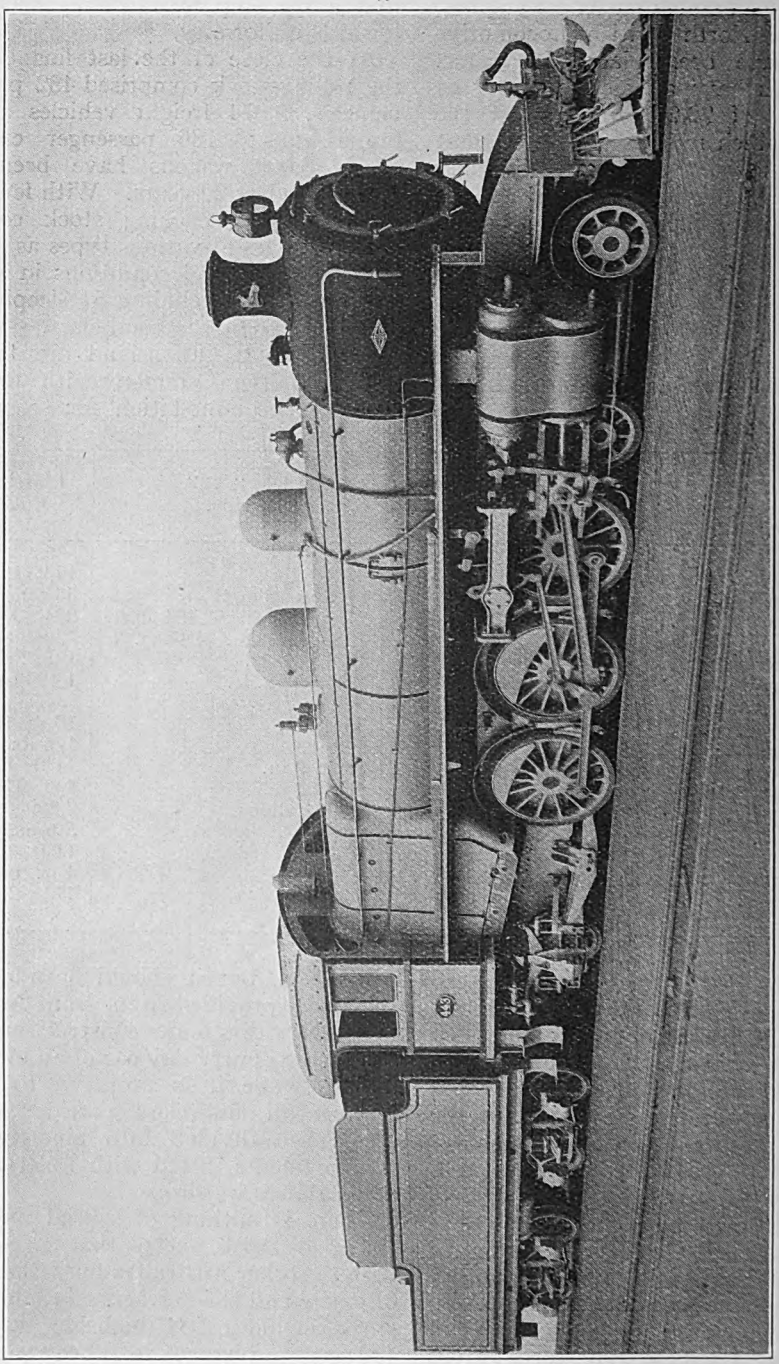

CLASS "P" 4-6-2 EXPRESS PASSENGER ENGINE.

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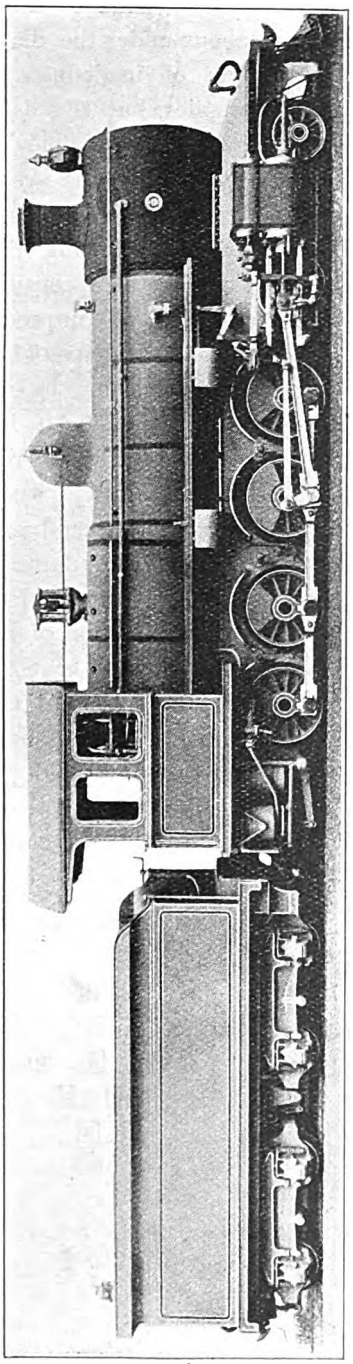
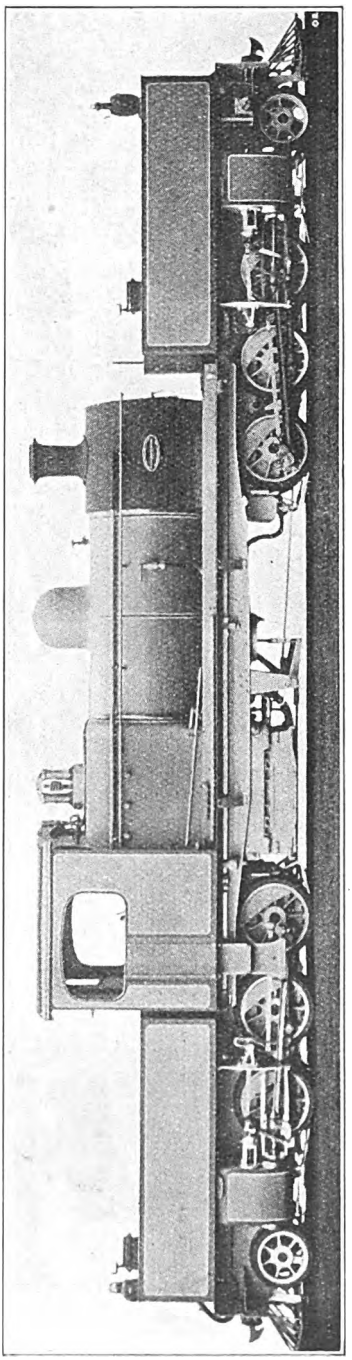


CLASS " F " 4-8-0 LOCOMOTIVE.



2-6-6-2 GARRATT LOCOMOTIVE

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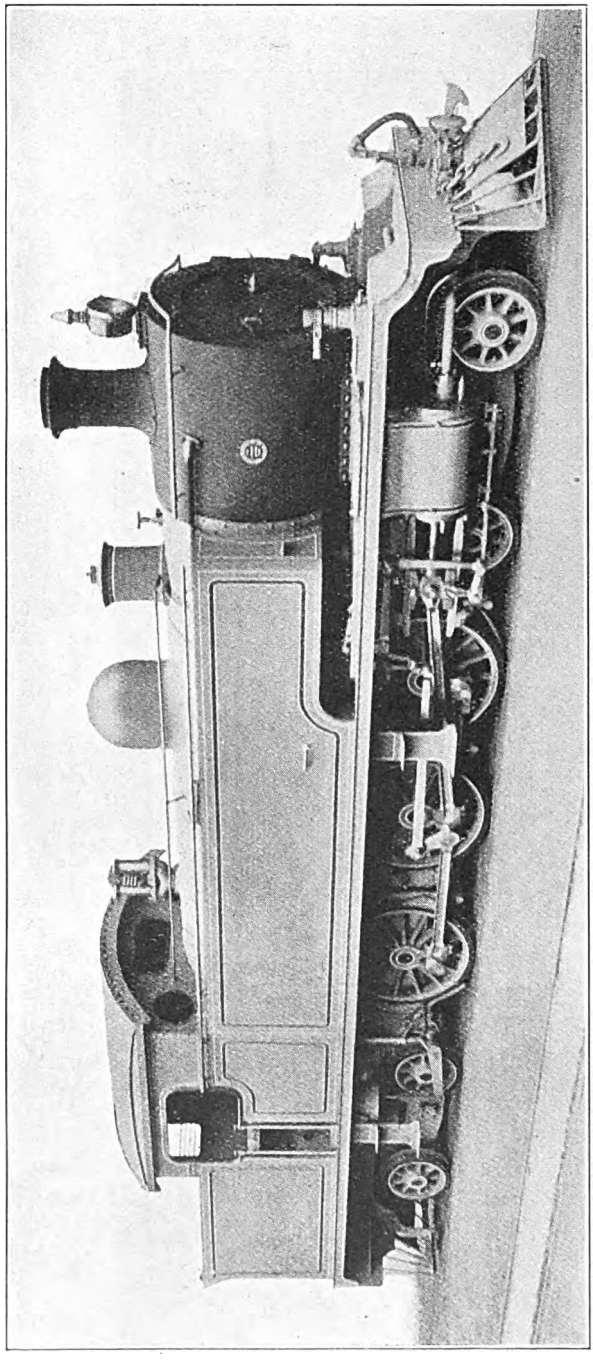

CLASS "D" 4-6-4 TYPE SIDE-TANK LOCOMOTIVE.

number 89, sheep wagons 67, and coal hopper wagons 50.

Some parts of the State labour under the disadvantage of inadequate water supplies, but this is being gradually overcome by the extension of the system of dams, which will have the effect of relieving the department of a considerable amount of unproductive work in the shape of haulage of water for locomotive requirements. An innovation which has resulted in an immense saving in water and water haulage is the roofing of dams in the inland districts. Prior to the introduction of roofing, fully 20 per cent. of the catchment was lost through evaporation, but since the innovation was adopted, it has been found that the loss from this cause has become almost negligible.

(To be continued.)

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New Electric Rolling-Stock, L.M.S.R.

HITHERTO the L.M.S.R. has employed vehicles of open-car types for the London electric suburban services. Experience ıs, however, shown that the compartment 'pe of vehicle is often more suitable for pid loading and unloading when traffic heavy, while it provides a larger proportion of seating space. Hence these new ains revert to the compartment system design and, at the same time, bring the ectric stock into closer conformity with ıe standards applicable to vehicles for eam services. They are in three-coach ıits, as usual, but are adapted so that two more units can be used together to eet the requirements of the busy periods. Orders have been placed as follows :—

28 third-class motor cars, Metropolitan Carage, Wagon & Finance Co. Ltd., Saltley, Birmingham.

24 composite trailer (intermediate) cars, Clayon Wagons Limited, Lincoln.

23 third-class control trailer cars, Midland ailway Carriage & Wagon Co. Ltd., Washwood eath, Birmingham.

A specimen train is illustrated, together ith first and third class interior views.

Principal dimensions are as follow :—

	Motor Cars.		Compo. Trailer Cars.		Control Trailer Cars.	
	Ft.	in.	Ft.	in.	Ft.	in.
ength over body	59	0⅞	57	0⅞	57	0⅞
ength over buffers	62	8	60	8	60	8
Vidth over body..	8	11¼	8	11¼	8	11¼
Vidth overall ..	9	3	9	3	9	3
leight over roof ..	12	4¾	12	4¾	12	4¾
entres of bogies..	39	6	39	0	39	0
Vheelbase of bogies	8	9	9	0	9	0
Veight of car unloaded	56 tons		28 tons		30 tons.	

The accommodation is arranged as follows :—

Motor-cars ..	Motorman's compartment. Switchgear. Guard's and luggage compartment. Seven third-class compartments seating 84 passengers.
Composite trailer cars	Four first-class compartments seating 40 passengers. Five third-class compartments seating 60 passengers.
Control trailer cars	Motorman's compartment. Guard's and luggage compartment. Eight third-class compartments seating 96 passengers.

In all three vehicles the whole of the body, sides, ends, roof panels, &c., consists of No. 14 gauge charcoal finish galvanised steel, and the floors of guard's, luggage and passenger compartments are of corrugated galvanised steel sheets covered with Decolite, the total thickness being 1¼ in.

The body framing of the motorman's and switchgear compartments is of steel angle sections with steel floor plate, covered with Jarrah mat in the motorman's compartment. The passageway of floor in the switchgear compartment, between the electrical equipment, consists of timber slats. The body framing of the luggage and guard's compartment and the passenger compartments is of timber, with interior finish of timber to standard designs.

All third-class seats are of the standard type, trimmed in crimson and black velvet, above which are arranged photographs, advertisement card and mirror in polished mahogany frames of standard pattern ; in the first-class compartments these frames are of polished walnut, and the seats are trimmed in blue cloth on the top side and American cloth on the under surface. The seats in this case are also of standard type. All ceilings and partitions above the cornice are panelled with 3-ply, enamelled white.

The cars are electrically heated and lighted, provision being made for control of the same by the guard or motorman at the end of each vehicle. In each luggage compartment is fitted an emergency box complete with tools and other necessary equipment to enable the staff immediately

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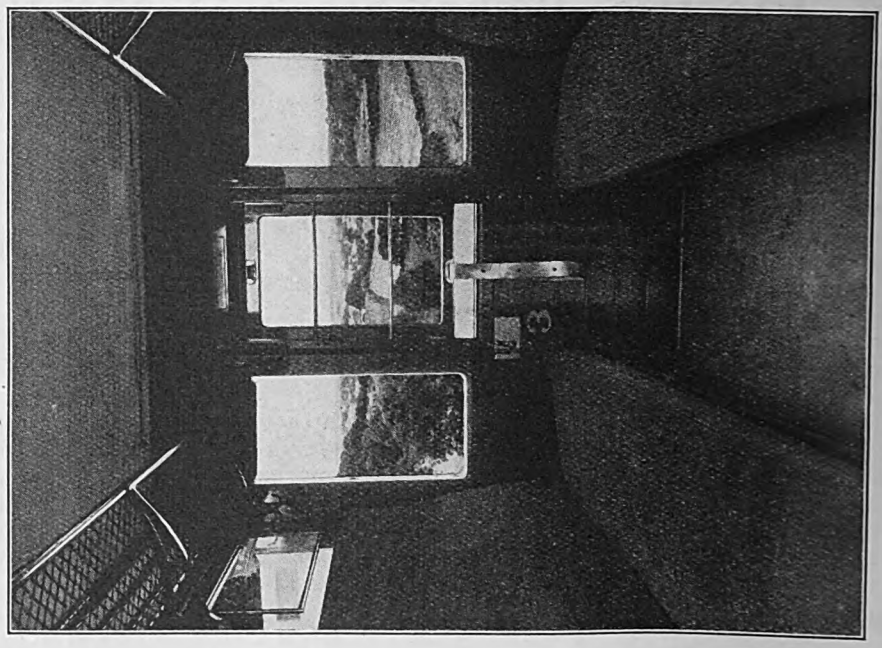
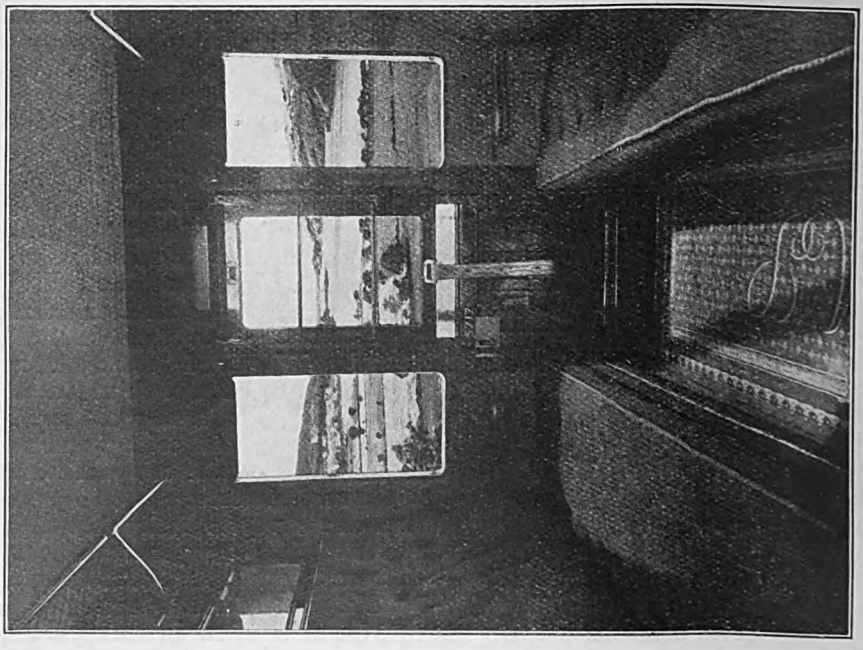


INTERIOR OF THIRD-CLASS COMPARTMENT.



INTERIOR OF FIRST-CLASS COMPARTMENT.

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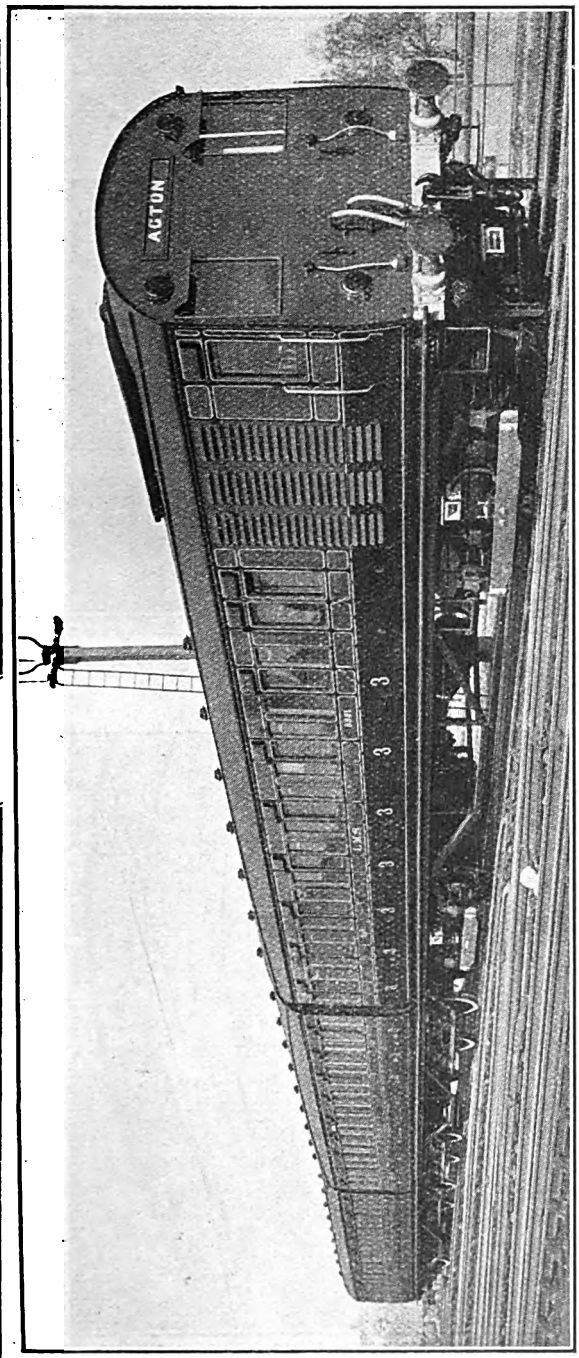

NEW ELECTRIC THREE-COACH UNIT.

to cope with the situation arising out of an accident, and in addition a two-piece ladder, buckets, ambulance box, emergency lamp, guard's seat, cupboard with desk top, and value locker are provided.

All underframes are built up of channel mild-steel rolled sections and plates. The bogies also are built of rolled-steel channels, angles and plates, and are fitted with laminated side-bearing springs, with I.R. auxiliaries and bolster springs of the helical coil type, two per nest, the whole so designed as to give the maximum comfort in riding. The whole of the vehicles are fitted with the Westinghouse quick-acting air brake, the motor and driving trailer cars being also fitted with hand-brake.

The carriages are painted crimson lake and varnished, and are picked out into panels by lining, to match the company's standard practice.

The designs have been prepared under the oversight of Mr. R. W. Reid, C.B.E., Vice-President for Works and Ancillary Undertakings, and Mr. E. J. H. Lemon, O.B.E., Carriage and Wagon Superintendent, in conjunction with Col. F. A. C. Leigh, T.D., Electrical Engineer, L.M.S.R.

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"UNDERGROUND" SCHOOL OF SIGNALLING AT SOUTH KENSINGTON.

POWER FRAME AND ILLUMINATED DIAGRAM APPLYING TO LOW LEVEL TRACK.

REPLACING premises at West Kensington, which, in course of time, and in view of the many developments which have been made in power and automatic signalling plant, have proved to be inadequate, the "Underground" School of Signalling at South Kensington is remarkable for its completeness and suitability for its intended purpose. It is located in a section of tube railway, built at the time of the construction of the Piccadilly tube, but never used. Examples of all signalling appliances are provided.

This school, it may be explained, is not intended for the training of operating staff, whose needs are otherwise met, but is attached to and used for the purposes of the Signal Department, under Mr. W. S. Every, Signal Engineer. It is open to apprentices and signal linemen, and to any other men of the department who wish to prepare for examination with a view to filling vacancies.

The method generally adopted for the training of men is to give them a lecture in the school, after which the students are allowed to examine and experiment with the apparatus installed. The operation of the apparatus is explained and demonstrated by qualified technical staff. When students have sufficiently advanced, faults are put on in various circuits for them to locate and rectify. The portion of the school set apart for lectures or classes of instruction has a capacity for about 60 students, and is fitted with forms and desks, blackboard, lantern and screen.

Monday evenings are devoted to dealing with general principles and rules of signalling and railway working practice. These lectures are intended mainly for training apprentices. On Friday evenings the work covers all signalling, including the most up-to-date A.C. installations, and is of an advanced nature for the benefit of linemen and others, so that they can keep in touch with all the latest improvements.

The average attendance during the last session was :—Monday evenings, 23; Friday evenings, 29. At the end of each session an examination is held, both in the technical and practical work, to ascertain what benefits the students have gained from the lectures and instruction. The school is also used for examination of each individual lineman before he is placed in charge of a section.

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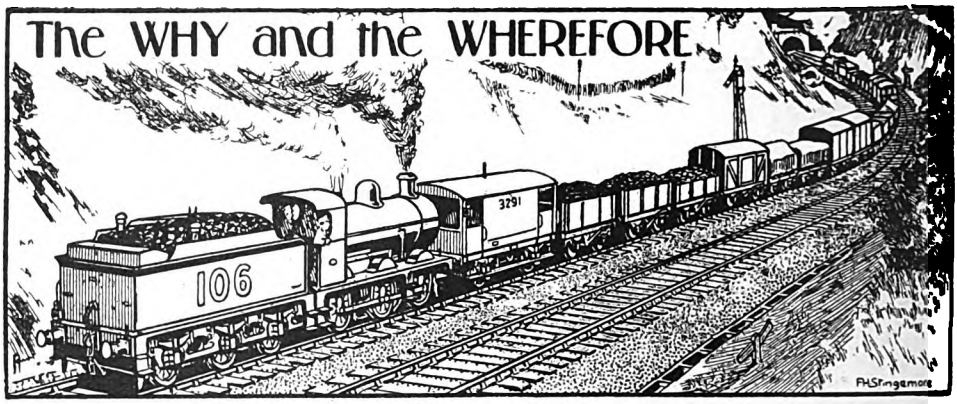

RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 33, *Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-ninth Annual Edition* (1926) *of this standard railway reference work is now published. All previous Editions are out of print.*

Single Line Working.

Where a section is controlled by train staff, if it is electric, a further staff can be obtained from either end, according to requirements, providing that the one last out has been replaced in one or other of the controlling instruments. If non-electric, and it is desired to send a second train in the same direction before one has returned, the driver of the first train takes a ticket, having seen the staff, the second driver carrying the staff. It is not usual for the staff to work the signals, as you suggest, but sometimes it has a key by which a locking frame (controlling signals, if necessary, according to circumstances) can be worked. Each electric staff then has a key section, but with the staff and ticket system the key can, of course, only be used by the driver having the staff. The necessity, however, usually arises only where intermediate shunting has to be done by a goods train.

[Reply to "DECAPODIAN."]

Signalling Queries.

Gatekeepers at level crossings that are not block signal-boxes receive intimation usually of the approach of trains by the block indications in the adjacent signal-boxes being repeated in the gate-house and by the bell signals being also repeated. In other words, the block-instrument wires pass through the gate-house and give the same block signals that are recorded in the boxes. With regard to the double signals you have noted outside Broadstone station, Dublin, without knowledge of the location in detail, we cannot answer your query. We can only suggest that the two arms you refer to are co-acting, the upper to be seen over the bridge and the lower to be seen under the bridge. We can hardly credit, however, that being done on a post only 18 ft. high.

[Reply to "GALTEEMORE."]

Light and Narrow-Gauge Railways.

Mr. W. K. Nash informs us that in 1921 the Corris Railway locomotives were painted dark green with thin red lines, and in 1924 the Eskdale passenger engines were Indian red, lined black; the goods tank engines, Heywood type, green; and the then new 2-8-2 tender locomotive was dark grey. Our correspondent understood at the time that the official colour was to be Indian red. Regarding the locomotives of the Weston, Clevedon and Portishead Light Railway, Mr. J. H. Hedley Robinson remarks that, as far

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as he can recollect, they are painted light green without lining, and the bogie tramcar type of coaches are salmon pink. The four-wheeled passenger coaches are painted light brown.

[Further reply to "DOLAULT HALT."]

Colours of Locomotives.

Mr. R. Lyle mentions that, according to his recollection, the colours of locomotives on the various small railways mentioned below are as follow: Blue—Kent and East Sussex, Ravenglass and Eskdale, Hundred of Manhood and Selsey Tramway, and Colne Valley and Halstead; black—Corris, Festiniog, and Glyn Valley Tramway; crimson lake—Tal-y-llyn, Leek and Manifold, Lynton and Barnstable, Ashover Light, and what was formerly the North Wales Narrow-Gauge Railway; green, but different shades—Shropshire and Montgomeryshire, Bishops Castle, Cleobury, Mortimer and Ditton Priors, and Weston, Clevedon and Portishead.

[Further reply to "DOLAULT HALT."]

Tractive Effort.

The system upon which tractive effort is calculated was explained in THE RAILWAY MAGAZINE dated January, 1927. From the particulars therein given, and the dimensions of the engine in question, you should be able to calculate the tractive effort of the "Lord Nelson" locomotive for yourself. "River" class 2-6-4 tank engines on the Southern Railway have, to a certain extent, superseded "Baltic" tank engines, in that no more of the latter class will, apparently, be constructed. The 4-6-4 engines already in service are, however, still taking a share in the heaviest traffic.

[Reply to E. B. A. R.]

Light Engine Workings.

The locomotives you have noted outside Waterloo station, S.R., coupled together with their vacuum pipes connected, were working between Waterloo and the engine sheds at Nine Elms, or proceeding to some other point for shunting duties, or to take over trains. The brake pipes are coupled up in order that the driver of the front locomotive, who is primarily responsible for observing the signals and controlling the movements of engines while they are coupled, may operate the brakes throughout, as required.

[Reply to A. GRUBER.]

Hither Green Sidings.

Presumably, the line you refer to is a curve providing for direct running from the Chislehurst line to the Dartford route, generally used for goods trains only. We do not understand the service upon which the private locomotive mentioned by you is running, unless your reference is to a connection with a firm's yard, and not to the curve mentioned above. The Lynton and Barnstaple Railway was taken over by the Southern Railway in 1923, subsequent to grouping.

[Reply to G. R. GRIGS.]

Locomotive Matters.

We hope, in due course, to give information which will settle some of the discrepancies between statements made by various correspondents from time to time in the "Locomotive Matters" section. For the time being, therefore, we cannot devote space to settling arguments in regard thereto. Similarly, we hope to deal with the various locomotive classifications, and must defer answering individual queries in regard thereto.

[Reply to "273A."]

L.N.E.R. Locomotive Working.

North British Atlantics are, presumably, able to meet all requirements on the Carlisle-Edinburgh (Waverley) route. We cannot say whether the Pacific locomotives are too heavy for this section but this explains why they are not used on the Aberdeen route. The fish train which passes Portobello at 5.33 p.m. is due to reach King's Cross at 2.55 on the following morning.

[Reply to "NEIL GOW."]

East Coast Single-Line Sections.

L.N.E.R. Edinburgh-Aberdeen trains traverse single-line sections from Lunan Bay to Montrose, crossing the viaduct over the two channels of the South Esk river, and beyond station limits at Montrose to Hillside, not far from Kinnaber Junction, where connection is made with the L.M.S.R. Tablet exchanging apparatus is fitted on these sections.

[Reply to "WAVERLEY."]

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Light Railways and the Southern Railway.

The railways mentioned by you are all light railways, and therefore do not come under the provisions of the Railways Act of 1921. We are not aware that any proposals have been made for their taking over by the Southern Railway. The Metropolitan Railway was exempted from grouping, in that it was an important section of the London local railways which were not covered by the Railways Act of 1921.

[Reply to NORMAN NEWTON.]

S. & D. J. R. Locomotives.

The fact that locomotive power on the Somerset and Dorset Joint line is provided by the L.M.S.R. explains why the 2-8-0 engines go to Derby shops for repairs. They have on various occasions been used temporarily for heavy freight working on various sections of the Midland Division, either for special tests or as a matter of convenience before being returned from Derby to the S. & D. line.

[Reply to G. H. MARILLIER.]

Illustration of L.N.E.R. Express.

The cutting sent by you, and taken from a contemporary journal, illustrates the L.N.E.R. 5.30 p.m. express ready to leave King's Cross on December 10, 1926. Those responsible for the descriptive underline were mistaken as regards the railway and train actually depicted. We cannot trace having published an article dealing specially with the railway system of Malta.

[Reply to "INTERESTED."]

Southern Railway Mileage.

In connection with the reduction in the mileage of the Southern Railway last year from 2,183 to 2,180, Mr. Charles E. Lee points out that this is accounted for by the rearrangement of the lines in the Ramsgate area, which became effective on July 2, 1926. The traffic returns for the week ended July 4 showed the larger mileage, and those for the week ended July 11 the reduced figure.

[Further reply to "NORTHERNER."]

Southern Railway 4-2-2-0 Locomotives.

There were six of these non-coupled engines, Nos. 720 and 369–373. Three have, we believe, been recently withdrawn from service, though we do not know the exact numbers. None of these engines has been rebuilt as a 4-4-0. Presumably the connecting line you refer to at Marlborough is one for exchange traffic, and is treated as a siding and not as a running connection. [Reply to "642A."]

Extreme Speeds During Railway Strike.

References such as that in the cutting sent by you are manifestly absurd, in that if a volunteer driver did run faster than a regular driver would do when running an important express, he was probably taking risks which the regular men know better than to take, while to accept any statements of the kind indicated one would require to have chapter and verse. [Reply to A. G.]

Double Tracking Single-Line Routes.

Referring to the reply to a query given under this heading in the April issue, Mr. W. K. Nash informs us that none of the Midland and South-Western Junction Railway has been doubled since the grouping. The average gradient from Cirencester to Chedworth is about 1 in 100, the actual gradients ranging about 1 in 150 to 75.

[Further reply to R. P. ANGUS LEWIS.]

Disused Lines.

Presumably, the unused track which you have noted to the south of Tamworth station, L.M.S.R., carried an old connection with the high-level line, displaced by connections more recently constructed. Similarly, the abandoned cutting noted by you near Shrewsbury also carried a connecting line superseded by altered connections constructed later.

[Reply to J. L. SUTCLIFFE.]

New L.N.E.R. Locomotives.

So far as we are aware, it is not the present intention of the L.N.E.R. further to multiply the "Mikado" (2-8-2) freight type, which is at present confined to two examples. We do not think that any of the latest 0-6-0 locomotives have been seen in London, their working being confined chiefly to the North Eastern and Southern Scottish Areas.

[Reply to S. WENYON.]

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Southern Railway Locomotives.

Presumably the Central Section 0-6-0 locomotive you noticed with spring balance valves on the dome is one which was designed by the late Mr. Stroudley. We assume that the "King Arthur" class 4-6-0's mentioned by you have had their tenders changed to meet conditions on the section upon which they are working.

[Reply to R. N. G. BELLWOOD.]

Electric Fouling Bars.

The signs you have noted at Victoria and Brighton Central stations, Southern Railway, indicate the location of electric fouling bars on the track. A light engine or vehicle standing thereon is fully protected by a lock in the signal cabin, the signs being provided for the guidance of enginemen.

[Reply to A. GRUBER.]

Eight-Wheeled Tenders.

Mr. Cecil J. Allen, and a number of readers, point out that 8-wheeled tenders exist in large numbers on the Caledonian, Glasgow and South Western, Highland, and Lancashire and Yorkshire sections of the L.M.S.R. In the case of the L. & Y. section, it is 0-8-0 locomotives which are concerned.

[Further reply to C. HANKINS.]

Highland Locomotives of the L.M.S.

You are correct in your contention that the 4-6-0 "Clans" were built to the designs of Mr. C. Cumming, who succeeded Mr. F. G. Smith. The 4-6-0 type designed by Mr. Smith was subsequently transferred to the Caledonian Railway, as the engines were too heavy for some of the bridges on the Highland line.

[Reply to D. MCFARLANE.]

Snifting Valves on Locomotives.

The small valves mounted directly behind the chimneys of certain superheated steam locomotives on the L.N.E., Southern, and other railways, are snifting valves, which, by opening when steam is shut off from the cylinders, allow air to circulate through the superheater elements in order to prevent the elements from burning. [Reply to G. E. SHIPP.]

Southern Railway Locomotives.

So far we have no information that the Southern Railway has any intention of systematically renumbering the whole of its locomotives. We would point out that some of the newest engines have numbers which duplicate those on other sections.

[Reply to G. S.]

"Special Duty" Engines, L.M.S.R.

As a result of a recent reorganisation, a certain number of "Claughton" class 4-6-0 engines which are in the best condition have been specially allocated to the maximum main-line duties of the Western Division, and are indicated by the letter "S" carried on the cab side-sheets.

[Reply to "IRISHMAN."]

Automatic Couplers.

Commenting upon the reply given on page 146 of the February number, Mr. L. B. Hewitt, of Bath, points out that automatic couplers are employed for the new South Wales trains introduced by the G.W.R. in 1923.

[Further reply to F. W. HUSSEY.]

Gradients.

In most other countries, including North America, it is usual to specify the inclination of a gradient on a percentage basis. Thus 1 per cent. grade would be 1 in 100, and a 5 per cent. grade, 1 in 20, and similarly for other figures.

[Reply to G. E. TENTON.]

Locomotive Numbers.

Although we occasionally give particulars of engines of particular classes we cannot supply information as to engine numbers, &c., on a general basis. Please see rules for this section. We do not recognise the engines mentioned by you.

[Reply to "EASTERN."]

C.K.R.

We have no information as to the name of the railway indicated by the initials C.K.R. appearing on the locomotive illustrated in Hudswell, Clarke & Co.'s advertisement as published in the February number. [Reply to H. C. KING.]

Locomotive Classification, L.M.S.R.

Particulars of the L.M.S. power classification have already been given in our pages. We cannot go into details as to the classification of individual classes or engines.

[Reply to P. A. T.]

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Rebuilt Somerset & Dorset Railway Locomotives.

We have no information as to the new power classification of 4-4-0 locomotive No. 45 as rebuilt. Presumably it is now classed with other locomotives which have received similar treatment.

[Reply to R. A. ATTHILL.]

S.R. Locomotive No. 774E.

Occasionally enginemen who take an interest in their locomotives adorn them in one way or another, and, presumably, the star which you have noted on the front of this engine can thus be explained. We have no alternative information.

[Reply to L. B. STOCK.]

Exmouth Junction, Southern Railway.

The new work at Exmouth Junction is now well advanced, and we hope to deal therewith in due course. Several preliminary references have already appeared, and the general nature of the work has been described in our pages.

[Reply to W. DEAN.]

Coach Measurements.

Where measurements of coaches are indicated on them, the dimensions are usually overall, *i.e.*, over buffers in length and over carriage doors and other external fittings in width.

[Reply to "TAMERLANE."]

Highland Section Locomotives, L.M.S.R.

"Clackmacudden" points out that the "Castle" class locomotives on the late Highland Railway were designed by Mr. Peter Drummond and the "Clan" series by Mr. C. Cumming.

[Further reply to "HIGHLANDER."]

March Frontispiece.

Your comment as to an "Up" train, and not "Down" express, being illustrated is noted. We have no further particulars beyond those supplied by the photographer.

[Reply to G. R. WINTER.]

L.N.E.R. Three-cylinder 2-8-0 Locomotive.

L.N.E.R. 2-8-0 locomotive No. 4461 was formerly G.N.R. No. 461. It is a three-cylinder engine, hence the six exhausts per revolution.

[Reply to "794A RIVER ROTHER."]

New L.M.S. 2-6-0 Type.

We know of no reason why the engine of this type stationed at Derby should not work through to Bristol, but we are not aware whether or not this is actually being done.

[Reply to "MOGUL."]

G.N. "Atlantics," L.N.E.R.

No. 3279, originally No. 279, is now the only G.N. section four-cylinder "Atlantic" type locomotive on the L.N.E.R. All the other "Atlantics" of this section are running as two-cylinder engines.

[Reply to P. BRADLEY.]

G.C. Named Locomotives, L.N.E.R.

A list of the named locomotives of the G.C. section, L.N.E.R., was given in THE RAILWAY MAGAZINE for January, 1926, and we must refer you to that issue for the information you require.

[Reply to J. WILLIS DIXON.]

Laindon Station, L.M.S.R.

You appear to have been misinformed, as a station "about 2 miles or less *west* of Laindon, on the L.M.S.R., would bring you to East Horndon—which is already well provided for.

[Reply to "STEPNEY EAST."]

L.M.S. Locomotive Classification.

The numbers on the side-framing of Western Division engines, just behind the left-hand buffer, probably indicate their power classification, though we have not seen any in the position that you indicate. [Reply to R. SANSBURY.]

Self-Trimming Tenders.

These are designed so that the coal tends to slide down a sloping surface, and thus maintain a fairly even level without requiring to be pushed down or turned over by the fireman.

[Reply to GERALD W. SPINK.]

L.M.S.R., Midland Section Locomotives.

Mr. J. R. Wedge informs us that Midland locomotive No. 2299 was broken up at Derby in 1919–1920, and certain minor parts used in the construction of the 0-10-0 banking engine No. 2290.

[Further reply to "PRO. G.W.RLY."]

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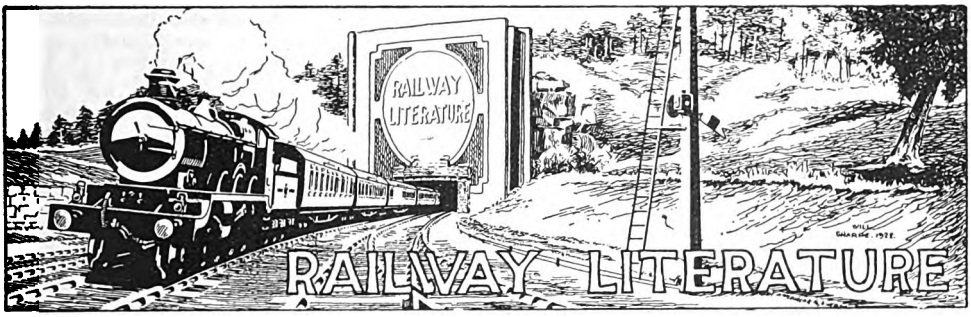

THE RAILWAY YEAR BOOK. [Railway Publishing Co. Ltd., 33, Tothill Street, London, S.W.1. Price 5s. net; by post, 5s. 6d.]

The fact that the *Railway Year Book* has now been published annually without intermission for a period of 30 years may be regarded as direct evidence that it supplies a definite demand. This is further supported by the extent to which it is used for reference purposes in the offices of railway companies, Government departments, newspapers and other publications, and trading and manufacturing firms, in addition to private persons in all walks of life. It can, indeed, claim to be almost, if not quite, unique in character, in that it presents or summarises a great deal of general information in regard to the home railways, much of which would otherwise have to be extracted from a wide field of literature, as well as giving statistical information on a very complete basis. Further, many of the most important statistics cover the year which has just been completed, such information not being otherwise available collectively until considerably later in the year. The particulars included of railways in Colonies, Dominions, Protectorates, and countries where British interests are prominent are also highly valued.

The present edition, the thirtieth, retains all usual features, revised as necessary and in some cases extensively. Among the special features may be mentioned the official portion of the article dealing with the London Midland and Scottish Railway, covering the progress of reorganisation right up to the date of closing for press, and the new tables, entirely rearranged, setting forth the steamship fleets owned and operated by, or in conjunction with, the Southern Railway. The present position of that company in respect of electrification is also set forth in the revisions of sections dealing with electric traction on the home railways. In the Colonial section changes due to the taking over of certain systems by the Indian Government are covered. New maps are included of the Southern, Midland and Great Northern Joint, "Underground," Great Northern of Ireland, African, and South American railways, while those of the Metropolitan Railway and of Australia have been corrected and altered in certain respects.

Owing to the fact that train service developments were impracticable last year, due to the general strike and the long-drawn-out coal dispute, the tables of long-distance non-stop runs and fastest runs, and of restaurant and Pullman car facilities, slip-coach and sleeping car services, &c., are repeated as for 1926. They are thus available for reference as showing the facilities which the home railway companies normally provide and upon which developments anticipated during the present year, including some intended for introduction last year, will be based. The detailed "index" introduced two years ago, and the list of "principal contents" are retained, while the "Who's who" section includes a number of new biographies, as well as covering the numerous official changes which have occurred since the 1926 edition was published.

'HOLIDAY HAUNTS" — SEASON, 1927. London: The Great Western Railway Company, Paddington Station, W.2. Price 6d.

This attractive publication is, as most of the travelling public are aware, the official guide to the holiday resorts served by the G.W.R. in England and Wales, the Channel Islands and the Isle of Man, and it includes particulars of accommodation for holiday-makers and travellers generally. It is so well known that it is unnecessary to enlarge on its merits, except to say that it has been brought up to date in every particular and now includes a special supplement containing much useful information concerning steamship services, manufacturers and wholesale traders. The book contains a number of very fine maps and a remarkably good and comprehensive index, while its pictorial section remains, as before, a thing of beauty and a joy to look upon.

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L.M.S.R. HOLIDAY REFERENCE BOOKS.—The 1927 edition of the London Midland and Scottish Railway Company's official illustrated guide and directory of seaside and country-side apartments, &c., makes a timely appearance. This year three separate volumes are being published for (1) England and Wales, (2) Scotland, and (3) Ireland respectively. Printed on white paper of fine quality and well illustrated with artistic photogravures, the "England and Wales" edition—a copy of which is now before us—contains concisely written and informative chapters on the holiday resorts of 40 counties. The edition in question is provided with a neat picture cover in colour, and the published price is 6d. These volumes are on sale at all L.M.S.R. booking and inquiry offices and on the railway bookstalls. In addition, the L.M.S.R. are issuing a 12-page booklet, with cover, calling attention to the holiday guide aforesaid. The booklet is remarkable for clear printing and the charmingly coloured landscape views which figure on each of its pages.

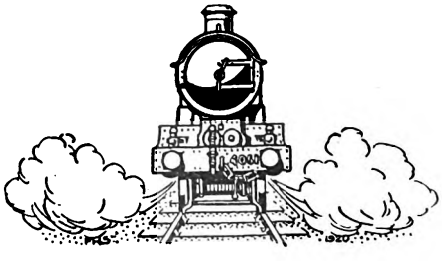
SOUTHERN RAILWAY'S ANNUAL HOLIDAY GUIDE.—"Hints for Holidays," the 1927 edition of the annual guide issued by the Southern Railway, is now available, and may be obtained, price 6d., on application at all S.R. inquiry offices and station bookstalls, or 10d., post free, from the London Commercial Manager, Southern Railway, London Bridge Station, S.E.1. The guide consists of 624 pages, and the solar aspect of its picture cover is quite in keeping with the company's well-known slogan. The book contains detailed and clearly printed descriptions of all the resorts from Kent to North Cornwall and the Channel Islands, chapters by Mr. E. le Breton Martin, the famous fisherman, on fishing the rivers and seas of the South Coast; and a list (with pictures) of the golf links served by the Southern Railway. Last, but all-important to the holiday-maker, there are thousands of hotel, apartment and boarding-house addresses of recognised standing, with many particulars concerning accommodation, &c.

GROUP RAILWAY MAP OF THE BRITISH ISLES.—[Published by John Bartholomew & Son Ltd., Duncan Street Edinburgh. Price 2s. 6d. net.]

This is a new edition of a map issued soon after the railways were amalgamated under the Railways Act of 1921, having been brought up to date in certain particulars. The dimensions are 36 in. by 30 in. and the map is arranged to fold to convenient pocket size within a stout cover. The main point is that the systems of the respective companies are clearly indicated by a strongly differentiated colour. The heights above sea-level of many of the stations are given. An inset, on a large scale, makes clear the ramification of railway lines in and around London. Canals and steamer routes are given with the distances between ports. County boundaries are marked, as well as the division of Ireland, and the counties in the Irish Free State have been given their new official names.

A.B.C. RAILWAY GUIDE.—Clear presentment has always been a leading factor in the popular railway guide known as the A.B.C.: but in their March issue, the proprietors of that publication have gone one better, so to speak, and by the employment of a new and larger-faced type for the figures denoting times of arrival and departure, they have not only vastly improved on the general appearance of their pages, but have also rendered a great service to those of us who find it difficult, without glasses, to decipher letterpress smaller than long primer or bourgeoise. In addition, a number of extra detailed services have been inserted, together with the double names of stations, with their cross references.

MESSRS. E. J. & J. PEARSON, LIMITED, of Firebrick Works, Stourbridge, send a useful booklet giving particulars of their premises and their standard productions.



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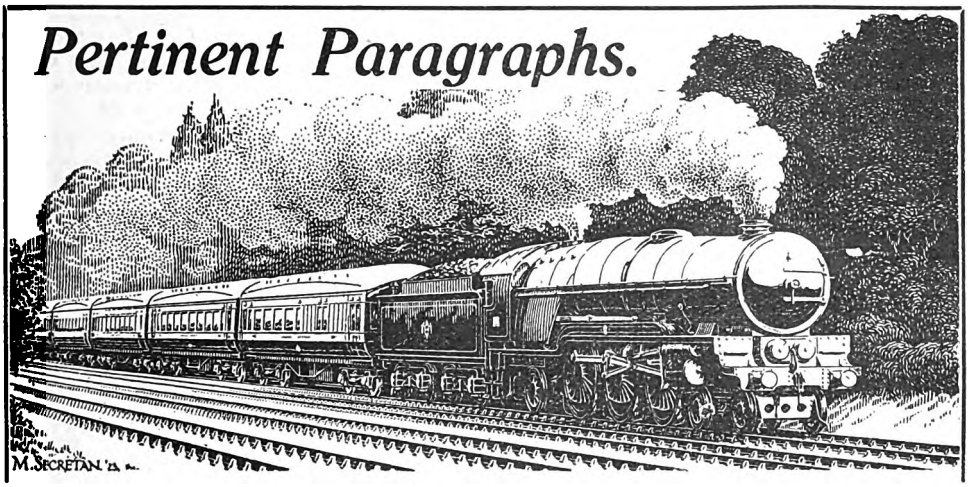
Pertinent Paragraphs.



G.N.R. No. 1 makes its Last Journey under Steam.

On Wednesday, March 23, the famous Great Northern single-driver locomotive No. 1 made its last journey under steam from Doncaster to York, and a photograph is reproduced as frontispiece, taken on the occasion, the engine being shown alongside a modern Pacific locomotive. No. 1, built in 1869, to the designs of the late Mr. Patrick Stirling, was the first of a class which attained world-wide fame. The outstanding feature was the big driving wheels 8 ft. in diameter, further distinction being added by the outside cylinders, the domeless boiler, and the curved roof cab. A large number of engines of the same class were built, some as recently as the closing years of the nineteenth century, these including slight modifications on the original design. For a long period they worked a large part of the main-line traffic of the Great Northern Railway, and in this capacity achieved many notable hauling and speed performances. Engines of this class figured in the 1888 race to Edinburgh, and in the 1895 race to Aberdeen. No. 1 herself completed a mileage of well over the million before she was retired. Reduced to a shell, she was shown at the Franco-British Exhibition in 1910, and for a number of years afterwards was kept at King's Cross Locomotive Depôt. For the Railway Centenary celebrations in 1925, No. 1 was restored to its original condition, and ran in steam in the procession of locomotives. Now she has gone from Doncaster to York, again under her own steam, to take her place as one of the most interesting exhibits in the London and North Eastern Railway Museum in that city.

Centenary of the First French Railway.

The ancestor of all the French railways was opened in the department of the Loire, from Saint Etienne to Andrezieux, in 1827, and France is preparing to celebrate this anniversary. The original reason for its construction was for the transport not of passengers, but of coal, from Saint Etienne to the Loire. The first request for authorisation to build a railway was made before 1820. This request was refused, but in 1823 six of the big industrialists of the region sought and obtained from Louis XVIII the concession for the first French railway, and the plans were approved in June the next year. The railway was only just over 12 miles long, and the total expenditure amounted to 1,783,195 fr. It has only a single track, the gauge being the same as that employed to-day, 1 m. 45 cm. There were 12 bridges and quite a number of cuttings, but no locomotives, the "chariots," as they were called, being drawn by horses. In 312 working days some 76,000 tons of coal were carried. It was not until 1832 that passengers were also conveyed, and not until 1844 that railway engines were employed, although steam power had been used on the Saint Etienne-Lyons Railway much earlier. Very little remains of this first railway—a bridge, a platform, and the station at La Querilliere. To celebrate the centenary, Reuter's Paris correspondent states that the P.L.M. Railway Company is having a tablet placed in the station of St. Etienne-Chateaucreux.

Notable Running with Grand National Specials, G.W.R.

Another record of fast running was accomplished by the Great Western Railway

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with the special trains run from Paddington to Birkenhead for Liverpool Races, arranged for Messrs. Pickfords' party to the "Grand National." One train, worked by engine No. 4097, *Kenilworth Castle* (Engineman Humphreys), principally composed of restaurant cars, weighed 298 tons. It left Paddington at 8.25 a.m. and ran without a stop direct to Shrewsbury via Bicester, 153 miles, at which point the engine was changed, the train being worked forward to Birkenhead by engine No. 2948, *Stackpole Court*, in charge of Engineman Scarrell. It arrived at Birkenhead at 12.15 p.m.—10 min. ahead of booked time—performing the journey of 210½ miles in 3 hours 50 min., at an overall speed of 55·9 m.p.h., excluding the stop at Shrewsbury.

A further notable performance was achieved by the other special restaurant-car train, with the remainder of Messrs. Pickfords' party to Liverpool for the "Grand National." This train started from Paddington at 7.50 a.m., and after calling at Ealing to pick up passengers, ran thence to Birkenhead via Greenford and Bicester, stopping at Shrewsbury only to change engines. Worked by engine No. 4081, *Warwick Castle* (Engineman Roberts), as far as Shrewsbury, at which point engine No. 2952, *Twineham Court* (Engineman Pugh), took it over, the train covered the distance from Paddington to Birkenhead in 4 hours, 1 min., at an overall speed of 53·7 m.p.h., excluding the stops at Ealing and Shrewsbury.

236 Miles Non-Stop.

EVER since the announcement was made that water troughs were being laid on L.M.S.R. routes north of Carlisle, a certain section of the general press has been concerning itself with the idea of non-stop runs between London and Glasgow. In this connection we may refer back to a "Pertinent Paragraph" in the April number, under the heading of "Long Non-Stop Runs." As we then showed, the probabilities of such working were very remote indeed, if only for the reason that it is difficult to conceive of enginemen working locomotives in continuous running for a period of eight hours, although the engines could probably do the run. The idea has now taken another form, the latest suggestion being that the only intermediate stop should be at Carnforth (236 miles), in which case the L.M.S.R. would effectively challenge the Great Western Railway's long-standing record run between Paddington and Plymouth. So far, there is no official warrant for the suggested practice, nor, if the working indicated is adopted, do we know whether it will be accompanied by a northern non-stop run from Carnforth to Glasgow, or, if applied to one of the Highland sleeping-car expresses, from Carnforth to Stirling or Perth. The fact that the whole route is now in one ownership, and Carlisle is no longer a frontier point, renders working of this kind quite practicable, if found desirable, and here again we may refer to the paragraph in question, in that we then suggested that it was by no means unlikely that engines might be changed at some point between Crewe and Carlisle instead of at both those stations as is at present usual.

Unique Feature in Oxford District Train Working.

A CORRESPONDENT sends some notes on the interesting peculiarities of railway workings at Oxford. Engines belonging to each of the four group companies work into Oxford daily on regular passenger services. G.W.R. and L.M.S.R. locomotives can be seen at all hours of the day, of course, but, in addition, a Southern Railway "King Arthur" class 4-6-0 works in from Bournemouth at 12.58 p.m., and returns at 2.25 p.m. with the Birkenhead to Bournemouth through train. At 9.50 p.m., and again at about 3.30 a.m., an L.N.E.R. G.N. section "Atlantic" passes through on its way between Sheffield and Swindon. In addition, at 2.35 p.m., the Bournemouth-Newcastle express arrives, usually worked by a G.W.R. 2-6-0 and made up of L.N.E.R. and S.R. coaches, with two L.M.S.R. postal vans at the rear.

Our correspondent mentions that it would be interesting to know whether engines of the four group companies can be seen working at any other station. There are a good many London stations at each of which engines of the four groups may be seen daily, but the number of such stations outside the London area must be extremely small, and, in this respect, train working in the Oxford district is almost unique.

The late Mr. A. J. Hill.

THE death of Mr. A. J. Hill, who retired in March, 1923, after having held the position of Chief Mechanical Engineer of the late Great Eastern Railway since 1915, removes one who, in a quiet unobtrusive way, had counted for a great deal in the field of locomotive engineering and of works management. All of his business life was spent at Stratford where, commencing as an apprentice, he worked in the drawing office, subsequently being appointed Works Manager's Assistant, Assistant Works Manager, and Works Manager, before becoming Locomotive Carriage and Wagon Superintendent, and eventually Chief Mechanical Engineer. In regard to works methods he was an acknowledged authority, while he was responsible for locomotive designs which, although

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including no exceptional features, were eminently suited to the traffic conditions and requirements of the Great Eastern Railway. He took a leading part in the educational facilities carried on at the Mechanics' Institute at Stratford, also in ambulance matters. During the war, as chairman of a committee covering the Southern railways, he was largely responsible for the organisation and carrying on of munition work in railway shops, and represented all the railways on the Priority Branch of the Ministry of Munitions. His death, at the comparatively early age of 64, will be regretted by all who had the privilege of knowing him. Only a week previously he attended the annual luncheon of the Retired Railway Officers' Society, as recorded in our last issue, when we had the privilege of renewing a long-standing acquaintanceship.

Exhibition of Railway Models at Wimbledon.

At the Hobbies and Handicrafts Exhibition, held at Wimbledon and extending over three days, commencing on Monday, March 21, an exhibit which attracted a considerable amount of attention was the stand of the Wimbledon and District Model Railway Club. A track was laid down along one side of the hall, and rides behind the model steam locomotives, kindly loaned by Messrs. Temple and Warren, proved a great attraction. Mr. Temple's engines were of the "Pacific" type, ¾-in. scale, 3½-in. gauge, while Mr. Warren's engine, also of the "Pacific" wheel arrangement, was constructed to the ½-in. scale, 2½-in. gauge. The Mayor of Wimbledon and the Right Hon. the Earl of Midleton, P.C., K.P., were among the passengers on the opening day. Mr. R. Walkley showed his 3½-mm. scale electrically-operated shunting yard, complete with S.R. & L.S.W. section, 0-4-4T locomotive and goods rolling-stock. The remote control fitted on this model was a special feature. A tiny 2-mm. gauge working model of a 0-6-0 goods locomotive and tender with coal wagon and length of track, by the same builder, was also on view. "O" gauge locomotives by Messrs. Miller and Plummer, rolling-stock by Messrs. Keefe and Rham, an "O" gauge signal cabin by Mr. Plume, and a section of an "OO" gauge railway by Mr. Fentiman, and a large model of a G.W.R. 4-4-2T locomotive were included, and a number of railway posters shown by Mr. Ashford completed an effective display. The first prize in the modelling competition (for the Exhibition as a whole and not exclusive to club members) was secured by Mr. R. G. Moore, a junior member of the club, with a 7-mm. scale model of L.M.S.R. Midland section 4-4-0 locomotive No. 487. Club arrangements for May include: May 2, at 7.45 p.m., Lecture on "Vacuum Brakes," by Mr. H. J. Dover, the Vacuum Brake Co. Ltd.; May 16, at 7.30 p.m., "Measurement of Electricity," by Mr. L. A. Marshall, the Stonebridge Electrical Co., Ltd., Acton; both meetings at the Red Cross Hall, Church Road, Wimbledon; May 28, Visit to Old Oak Common Locomotive Depôt, G.W.R. Copies of the March issue of *Railway Pie*, the official journal of the club, can be obtained, price 4½d. post free, together with full information regarding the club, upon application to the Hon. Secretary, Mr. R. Shephard, 27, Bernard Gardens, Wimbledon, S.W.19.

Railway Convalescent Homes.

A banquet was held under the auspices of the Governing Body of the Railway Convalescent Homes at the Wharncliffe Rooms, Hotel Great Central, Marylebone, N.W.1, on Tuesday, March 29, when Sir Josiah Stamp, G.B.E., D.Sc., President of the Executive, London Midland and Scottish Railway, who was accompanied by Lady Stamp, presided over a large attendance.

In the course of his speech on behalf of the Home, Sir Josiah Stamp pointed out that the occasion marked the completion of 25 years of work by the Railway Convalescent Homes movement. There were elements of real romance about its life. There was the unselfish service of those founders of the movement who had great faith and a remarkable combination of caution and enterprise, and those on the Committee who during that period had served so long and faithfully down to the time of their genial and most energetic secretary, Mr. Culver. The movement was devoted to the provision of convalescent benefits for railwaymen and women, and railwaymen's wives, and the contribution was ½d. per member per week as a minimum. The financial growth might be seen by comparing 1902 and 1925. In the former year contributions brought in £1,600, and the number of patients was 465, while in 1925 contributions were £40,000 and the number of patients 6,054. Sir Josiah gave the dates of opening of the seven Convalescent Homes now established, and said there were 12 trustees and 140 Committee men and women responsible for the management. He added that while current expenditure was guaranteed on a satisfactory basis, the organisation had by no means reached its final goal. He concluded with a reference to the development of a new scheme whereby convalescent benefits would be available for railwaymen's wives with their infants, and remarked appreciatively on the dignity and value of the convalescent homes movement in railway life. Mr. William Tyrrell (Chairman of the

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Board of Trustees), then reviewed the history of the movement. Mr. F. W. Wheddon (Trustee), proposed the toast "Our Guests and Supporters," coupling therewith the names of Lady Stamp, Mr. J. C. Mitchell and Mr. J. L. Thompson. Lady Stamp, who was received with applause, said it gave her very great pleasure indeed to be there that evening. She wanted them all to feel that she was doing her best to support her husband in the great work he had undertaken. She wanted them to think that she was a railwayman's wife, and it was from that point of view she spoke principally in regard to the new scheme for providing a home for railwaymen's wives with babies in arms.

Mr. J. C. Mitchell added some appropriate and interesting remarks, also telling a few stories. He concluded with a few remarks on the excellence of the Convalescent Homes movement, with which he was heartily in accord. Mr. J. L. Thompson also responded.

Mr. W. R. R. Culver said he had pleasure in telling those present that the dinner had been productive of bringing in £6,000 to the funds of the Institution. Their friend Mr. Mitchell, who had already spoken, had helped them not only in word but in deed, and his help was extremely appreciated. It was their desire to acquire all the properties as the full properties of the Board of Trustees, and they hoped that in due season this would be attained. The toast of "The Chairman" was proposed by Mr. R. H. Selbie, who referred in humorous vein to business associations with Sir Josiah Stamp. So far as the Convalescent Homes were concerned they were doing exceedingly fine work for the benefit of all connected with the railway service. The toast was received with musical honours. Subsequently Sir Josiah Stamp said that he had received nothing but kindness since he came into the railway service.

Parkgate and Rawmarsh Accident.

COLONEL SIR JOHN PRINGLE'S report on the fatal accident which occurred on November 19, near Parkgate and Rawmarsh station, L.M.S.R., has been issued. The 10.10 a.m. express passenger train from York to Bristol was travelling on the up fast line at a high speed, and came in contact with wreckage caused by derailed wagons of the 7.20 a.m. special mineral freight train from Westhouses to Royston, which was travelling at a slow speed on the adjoining down slow line. The engine of the passenger train escaped damage, but the debris scraped the sides of the first three coaches, and ripped out the sides and interior of the two rear coaches. No vehicle of the passenger train was, however, derailed. Nine passengers were killed or succumbed to their injuries, two others were detained in hospital, and 25 suffered from minor injuries or shock effect. The guard of the passenger train was also slightly injured.

The passenger train was drawn by Midland 4-4-0 locomotive No. 387, while the mineral train was drawn by 2-4-0 engine No. 270

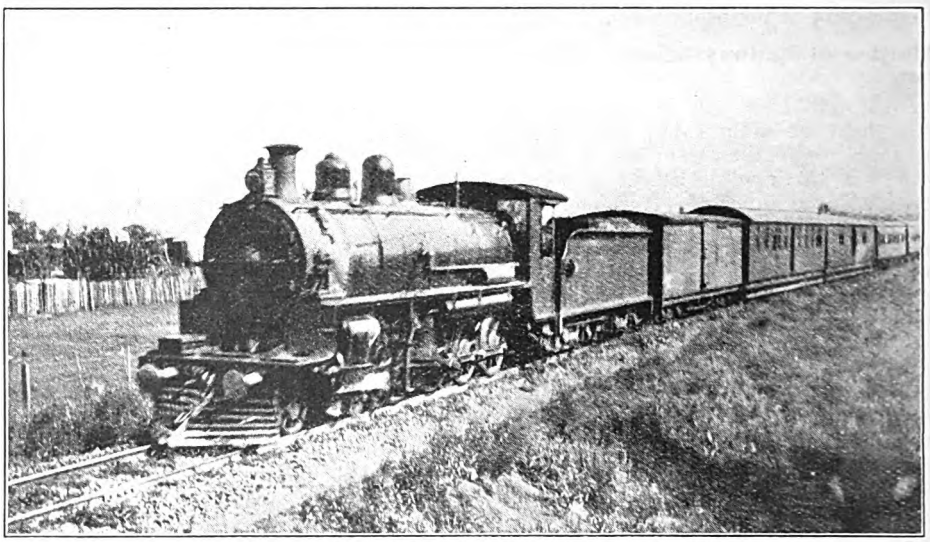

Photo.] **CHRISTMAS DAY, 1926, IN QUEENSLAND.** [*W. H. Warren.*

Brisbane Limited Express leaving Toowoomba. 4-8-0 locomotive No. 699.

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and 0-6-0 locomotive No. 3980. The accident is attributed to the failure of a private owner's colliery wagon which became derailed in circumstances which, owing to the presence of a signal post, caused the wreckage to scrape the side of the passenger train passing at the moment, with disastrous results. The report is mainly concerned with the defective condition of the wagon primarily responsible. Owing to the sudden check to the mineral train by brake applications on the engines, several wagons became piled up, while the signal post for the up fast line was fouled and thrown down just as the express was passing. The inspecting officer expressed the opinion that some, at least, of the damage to the passenger vehicles was caused by the signal post, though whether the damage to the last two or three coaches was caused by the same obstacle, or by part of the wrecked wagons, is not clear. With regard to the responsibility of the railway staff, it is thought that the leading driver of the mineral train rather misjudged the circumstances in bringing his train to a stand, though Sir John Pringle considers that, having regard to all the exceptional conditions, his misjudgment was excusable. The original cause was, however, the collapse of the mineral wagon, and Sir John Pringle recommends that all wagons should be submitted for detailed and careful examination at least once in every ten years of their life. With regard to private owners' wagons, this would necessitate re-registration at the end of every ten years, without which wagons should not be permitted to run on railway lines. To be of practical service, regulations calling for periodical registration of private owners' wagons must be common to all railway companies. "The matter appears to be of such importance that I feel sure it will receive the careful consideration of railway companies generally."

A Fortuitous Accident.

THE general situation is summed up in the following remarks: "The circumstances attending this collision were exceptional, and some of them very fortuitous in character. If there had been no signal post at this particular spot, or if the express had passed the point two or three seconds earlier, there would have been no collision. But the very serious results which followed the failure of this wagon make it necessary that further precautions should be taken to ensure a high standard of wagon maintenance in general, and that stock is not allowed to deteriorate and get into a weakened condition. Ordinary inspection, such as is given by carriage and wagon examiners, is not sufficient to ensure this. More detailed periodical examination is therefore necessary."

Under the heading of availability of first-aid equipment, stretchers, &c., the report may be further quoted as follows: "Information furnished by the railway company regarding the availability of first-aid appliances in the vicinity of the scene of the accident may be of general interest. The passenger express carried the company's standard first-aid and rescue equipment. There were, in addition, ambulance boxes available (*a*) in Parkgate and Rawmarsh booking office, (*b*) in Parkgate and Rawmarsh platelayers' cabin, (*c*) in Parkgate Junction platelayers' cabin, and (*d*) in Parkgate Junction signal-box. Three of these boxes were used on this occasion. An ambulance box was also sent from Rotherham (Masborough) station. A stretcher was available in Parkgate and Rawmarsh booking office. In addition, five stretchers and first-aid appliances were voluntarily supplied by Messrs. John Brown & Co. Ltd., Aldwarke Main Colliery; and three stretchers, only one of which was used, along with first-aid appliances by the Parkgate Iron & Steel Co. Ltd. Two motor ambulances belonging to the Rotherham Corporation and one to the Rawmarsh Urban District Council were used for conveying the injured from the scene of the accident. One baker's motor delivery van was also utilised. Of the London Midland and Scottish Railway Company's employees on the scene of the accident, five were qualified in ambulance work."

Fog Services in Sunshine.

A *Times* correspondent recently commented upon the fact that although, when he travelled up to town, the sun was shining brightly, he found a fog service in operation. This is a very natural comment, and one which can often be made. It shows, however, no recognition of the conditions under which railway traffic has to be operated. The trouble is that, particularly in the early spring, it often happens that there is considerable mist and sometimes actual fog about in the early hours of the morning. It has, therefore, to be decided whether to commence the morning service on the basis of ordinary or reduced fog services. It is not often that results show the decision made to have been unjustified, but now and then it happens that fog or mist conditions continue, so that a full service has to be operated under difficulties, or the weather clears so that the full pressure of travel has to be conducted on the basis of reduced services for which there is then no apparent explanation. Consequently, although a long-distance season-ticket holder may find that the journey throughout is made in bright sunshine, yet at an earlier hour conditions in town may have been such as to afford

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ample justification for the inauguration of fog working. What is not realised by the general traveller is the fact that to add trains in the middle of the peak period tends to complicate working very considerably, and is not always practicable.

The Orient Express.

A LONGSTANDING reader sends particulars of a journey by the tri-weekly Orient express, as far as Vienna: "The express runs from Ostend, in connection with the 2 p.m. service from Victoria on Tuesday, Thursday and Saturday. The train at Ostend consists of two baggage cars, one diner and one or two sleeping cars. Leaving Ostend at 8.15 p.m. there is a stop of 2 min. at Ghent and Brussels is reached at 9.42 p.m. Dinner is served between Ostend and Brussels. Cologne is reached at 2.38 a.m., and here the Amsterdam-Vienna sleeping car is attached to the train. Stops are made at Wiesbaden, Frankfurt-on-Main. Wurtsburg, Nurnberg, Regensburg, Passau, Linz and St. Polton. At Linz the composition of the train is altered. The diner is taken off, together with one of the baggage cars, and the sleeping car from Calais, which runs in connection with the 11 o'clock service from Victoria, is attached, also two sleeping cars from Paris and a dining car from Paris. Vienna is reached at 6.35 p.m., central European time. The distance from Ostend to Vienna is about 827 miles and, allowing for one hour difference in time, an hour for Customs at the German frontier, and half an hour for Customs at Passau, together with another half an hour for making up the train at Linz, it means the net time to Vienna is about 19½ hours. The average speed between Ostend and Vienna is about 43 miles per hour. The first-class fare from London at the present time is £8 12s. 11d., which works out slightly over 2½d. per mile, plus a rather heavy supplement for *train-de-luxe* and sleeping car. Altogether, the journey is a very comfortable one and, I should say, equal to pre-war."

The First Railway in Nepal.

THE Rev. W. Machin, writing from Azangarh, sends particulars of the opening, by the King of Nepal, on February 16, of the first line of railway in Nepal. "This kingdom has always been, and is still, closed to Europeans, by arrangement with the Government of India, and up to the present it has had no railway. The capital, Katmandu, was till recently reached only by difficult and dangerous forest tracks, with an unmetalled road for the first 25 miles or so from the British-Indian frontier. The Maharaja, who is hereditary Prime Minister, has carried out great improvements. Now, the first 28 miles from Ruxaul, in Bihar, within the British frontier, is covered by a metre-gauge railway line. This ends at a terminus named Amlekhganj, whence a broad road runs for some miles, and where the steep hills begin there is a bridle path, with one of the longest ropeways in the world, for the transport of goods, which goes right up to the capital.

"Only three Europeans were present at the opening ceremony, performed by the King, attended by the Maharaja. These were Mr. Leslie Martin, of Messrs. Martin and Co., the engineers, Mr. C. J. Hendry, the consulting mechanical engineer, and the representative of the *Statesman*. The chief engineer is Mr. G. C. Das. The published photographs show that the line is worked by tank engines, apparently 4-6-0, with side tanks. There is no physical connection with the Bengal and North-Western Railway at Ruxaul, but a siding runs alongside the goods shed of the Nepalese Government Railway. The Government of India made over to the Nepal Government the land required for their line to come up to the B. and N.W. Railway from their frontier, a few hundred yards away.

"The new line will be used not only by travellers to the Nepalese capital, but also by the very numerous pilgrims to the famous shrine of Shri Pashupatinath.

"Nepal is a curious country. It is only recently that serfdom has been abolished by H.H. the Maharaja, who has introduced many reforms. His own position as hereditary Prime Minister is not one of the least curious things about the country. Whether the lower slopes of Nepal, most of which consist of high mountains, will have other railways made in them remains to be seen. It is not intended that the long seclusion of the country from Western visitors should come to an end, but the introduction of so western a thing as a railway must surely, though not perhaps in the near future, lead to great and increasing changes."

Edinburgh and Glasgow Routes of the L.N.E.R.

WRITING in reference to the articles by J. Francis, published in the January and February numbers, Mr. C. E. S. Littlejohn sends some interesting comments, which may be quoted as follow:—

"The photograph of Grahamston station is interesting, in that it shows a feature not very often found on a main line, *i.e.*, a facing crossover road, the purpose of which is to allow goods trains coming from the east to run direct into a loop on the west side of the station, but on the north side of the main line, without having to reverse. There are similar crossovers at Grangemouth Junction (distant about as far as can be

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seen in the photograph), both on the main road and on the Grangemouth branch, in order to allow goods traffic to be diverted into a similar loop which lies on the east side of the station, just beyond the bridge seen in the illustration.

"With regard to the curve from Carmuirs East to Carmuirs West, it may be of interest to note that although it is the property of the L.M.S., the only passenger trains using it are those belonging to the L.N.E., which run between Glasgow and Grangemouth, two a day in each direction. It is, of course, largely used for L.M.S. goods traffic. With regard to the L.N.E. Waverley-Larbert trains, in addition to the two mentioned, 3.27 p.m. from Waverley, returning from Larbert at 5.40 p.m., and 5.31 p.m., returning at 8.5 p.m., there is a train from Larbert to Waverley at 7.50 a.m. As there is no corresponding train in the other direction, the coaches which go to form this train are sent out overnight on the 3.27 from Waverley and an engine comes out 'light' from Edinburgh about 7 a.m. At present, also, there is a Saturdays only train which leaves Waverley at 1.32 p.m., and terminates at Grahamston at 2.26, stopping at all stations *en route*, and returning to Edinburgh at 2.40 p.m. Lastly, there is a train which leaves Waverley daily at 10.45 a.m., stops at all stations, reaches Grahamston at 11.50 and returns to Polmont at 11.57 p.m. After waiting there for the best part of an hour, it resumes its journey to Glasgow as a stopping train.

"The local traffic between Polmont and Grahamston is practically entirely provided for by the Polmont-Grangemouth trains. As the junction for the Grangemouth branch faces towards Larbert, all the Polmont-Grangemouth trains have to reverse at Grahamston. Roughly speaking, there are about a dozen of these during the course of the day, and I think only two which run from Polmont to Grahamston and back again without going to Grangemouth. As stated in the article, Grangemouth, is also served by L.M.S. Larbert locals. Incidentally, Grangemouth station has suffered considerable damage in the severe gale of January 28. The approach to Grangemouth station is not without interest. The branch is double line, and continues right on to the docks. The passenger station is on what is practically a single-line branch of the 'main' branch line, and is worked on the staff system, the staff being used to unlock the points of the 'running round' loop. That, of course, means that only one train can be in the station at the same time.

"Of L.M.S. main-line trains, one in each direction calls at Polmont (10.26 a.m. from Grahamston) and the 9.45 from Edinburgh. One, the 4.4 from Grahamston calls at Manuel, and the others are all non-stop. For some considerable time all the Edinburgh-Glasgow Sunday trains have been working via Grahamston instead of by the direct route through Falkirk (High), owing to certain repairs which have been found necessary on the tunnel near the latter station, but, lately, ordinary working has been resumed."

The Hull Accident.

THE coroner's jury which inquired into the 12 deaths arising out of the Hull collision of February 14, having returned a verdict of "Accidental Death," and pending the issue of Sir John Pringle's report to the Ministry of Transport, it is now practicable to explain how it became possible for the outgoing Scarborough train to get on to the wrong road and thus to meet, head-on, the train arriving from Withernsea. Of the several running lines in the approach to Hull station, three are concerned in this accident. The most northern of the three is B, an incoming road, next is C, an outgoing road, and then D, another incoming line. From B to D is a through road, with facing points, worked by No. 83 lever, in B line, and with trailing points, worked by No. 96, in D line. In this through road is a slip point, worked by No. 95, that is facing to trains coming out on road C. Campling, the signalman in charge, told signalman Clarke to admit the Withernsea train, *i.e.*, from B to D, as soon as the Scarborough train had passed. That necessitated the moving of Nos. 83 and 96 points; No. 95 had to remain normal. The Scarborough train was leaving on road C, and as long as its signal, No. 171, was "off," all the points were held. Signalman Gibson worked the signals, and as soon as the greater part of the train was past No. 171, he restored it. Clarke evidently was anxious to get the Withernsea train in, so as soon as No. 171 was restored, he went to move Nos. 96 and 83, points which were not passed over by the Scarborough train. Though Clarke states that he has no recollection of having done so, it is fairly evident that he pulled No. 95 instead of No. 96, and so turned the Scarborough train through the slips, and No. 83 points on to B road. As it may be urged that track circuit would have held No. 95 points as the train approached them, it may be pointed out that this place was signalled in 1905, before track circuit had been developed to its present position.

Express Train Running in Canada.

REFERRING to remarks in the October number as to fast running on Colonial railways, Mr. F. B. MacArthur, writing from Winnipeg, sends particulars of what is,

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so far as he is aware, the fastest run of its kind in America. In this connection he sends a sheet from the Canadian Pacific time-table of August, 1926, and directs reference particularly to C.P.R. train No. 38. This train leaves Toronto at 1 p.m. for Montreal, and makes the run of 340·5 miles, terminal to terminal, in eight hours, or at an average speed of 42·5 m.p.h., inclusive of 17 minutes consumed in stops at two divisional points *en route* (Trenton, 7 minutes, and Smiths Falls, 10 minutes) to change locomotives, and at the latter point the coaches for Ottawa are dropped from the Montreal section of the train. "In this run there are 13 regular and 13 provisional stops, 11 regular and 11 provisional of which occur in the 221·8 miles between Toronto and Smiths Falls. Also please note that the first 20 minutes out of Toronto is consumed in travelling 5·3 miles of Toronto terminals, one stop being made in that time. The fast running, however is done between Smiths Falls and Montreal West, where the 124 miles between those points are covered in 127 minutes (58·58 m.p.h.), with one provisional stop at Bedell, and the 103·2 miles from Bedell to Montreal West are done in 104 minutes (59·53 m.p.h.). Another interesting feature is the fact that from Agincourt to Glen Tay, 183·5 miles, the line is only single track, and in that mileage there are nine regular and nine provisional stops. I am informed that the train usually consists of six coaches leaving Toronto (two for Ottawa being set out at Smiths Falls), and is hauled by one of the "2200" class Pacific type locomotives, behind which I estimate the weight of the train would be 450 tons out of Toronto and 300 tons from Smiths Falls to Montreal."

New Zealand Government Railways.

COMMENTING upon recent remarks by Mr. N. Blake, suggesting that the view reproduced on page 260 of the April, 1926, number is erroneously described, Mr. Housego, the original photographer, writes as follows :— "Mr. Blake infers in his remarks that, owing to there being two engines on the train shown in photograph, the said train could not possibly have been the 'Limited' as stated by me, Mr. Blake adding that this train is limited to one engine load over the Auckland section where the photograph was taken. It is true that the railway department strictly adhere to the 'Limited' restriction, and also that the train is kept within the capacities of one locomotive, but the photograph in question was taken, it must be remembered, in the height of the Christmas 'rush' season, and doubtless the authorities would not at their discretion allow an otherwise hard-and-fast rule to stand in their way at such a time if the only alternative meant running yet another extra train to those already put on as holiday specials. As regards the photograph itself, this was taken three miles from Auckland at approximately 9.50 a.m. on Christmas Day, 1925. The 'Limited' was due to pass this spot about 9.30; no train passed here at that time or immediately before, so when the train from Wellington (illustrated) came along, I naturally concluded that it was the 'Limited' with a special holiday overload on and running a bit late; the previous train from Wellington should have passed here two hours earlier. I might also add that, unknown to me at the time, a friend of mine, Mr. W. W. Stewart, was at a point 1½ miles nearer Auckland ready with his camera to snap the 'Limited' for his Christmas Day photograph, and he also concluded that this same train, which he snapped after passing through the Parnell tunnel, was the 'Limited.' Mr. Blake's contention that only one engine is ever seen on the 'Limited' does not hold water, I'm afraid, for only this last week Mr. Stewart took a snapshot of the 7.53 a.m. daylight 'Limited' for Wellington leaving Auckland with two engines at the head of the train."

The Music of the Railway.

As in every large section of the community, music figures to a substantial extent in railway circles, as shown by the number of choral, orchestral and operatic societies, with various military bands, of which the members are wholly or mainly recruited from the railway staff. This is, however, not quite the same thing as railway music, though there is no apparent reason why composers should not find as much inspiration in railway conditions, surroundings and romance, as in nature, social life, war and other circumstances of a general character. Yet it is but seldom that titles of railway application are adopted, and it is even more rare for ideas based upon railway conditions and circumstances to be utilised. There can be no doubt, however, that even a suggested railway application arouses special interest, and it was on that ground that we listened to a recent performance, under B.B.C. auspices, of Honegger's symphonic movement entitled "Pacific 231," though it must be confessed that the music, besides being ultra-modern and difficult to appreciate, emphasises the truth of the old saying that "a rose under any other name would smell as sweet." It has been explained that the composer, of Swiss nationality, "has a passion" for locomotive engines, and we are glad to hear that he is thus numbered among the thousands of persons, not actually con-

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cerned with railway work, who take a keen and intelligent interest in locomotive design and performance and in railway operation. The figures "231" are, of course, the axle notation, as used on the Continent, of the 4-6-2 wheel type. It is of interest, too, to note that the L.N.E.R. gave the composer the privilege of riding upon the footplate of one of Mr. Gresley's L.N.E.R. Pacific locomotives.

The Most Southerly Railway in the World.

SEVERAL letters are to hand in regard to the photograph reproduced on page 398 of the November, 1926, number. Mr. Housego writes: "I wish to point out that the engine shown is obviously a class 'X' 4-8-2 type, not a 4-8-0 as stated. Also that the view is identical with a picture postcard that has been on sale in stationery shops out here for the last dozen years or so illustrating a goods train ascending a bank on the 'Spiral' section of the North Island main trunk line about midway between Auckland and Wellington—not, as stated by Mr. Blake, as a scene on the Invercargill-Bluff line of the South Island. The engine shown, I notice, has a sheet covering to the cowcatcher to serve as a modified form of snowplough in winter, as the section of line on which the class 'X' locomotives are used reaches up to 2,660 ft. above sea level. Some of the 'X's' are fitted with these, but, in conclusion, I would point out that no class 'X' engines are running in the South Island. Although built down there, they were designed specially for this one particular section of main line in the North Island —that which runs through the mountainous parts between Tarhope and Taumarunia."

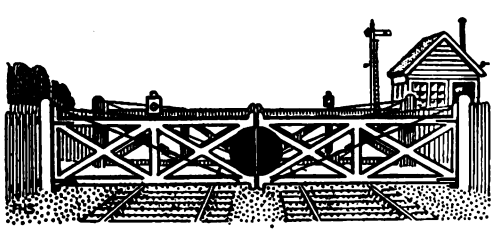
Mr. Stewart comments in the following terms:—"I do not understand why Mr. Blake sent you that photograph as of a train on the Invercargill-Bluff section, for it is of a goods train ascending the Raurimu Spiral (North Island main trunk) with 4-8-2 'X' class engine. There is none of these engines working in the South Island, and, besides, I know the photograph well, it having been sold at one time in every stationer's shop in Auckland."

Suggestions Bureau at Euston.

THE value of suggestions from the staff generally, and particularly from those who have useful ideas in connection with the work they are themselves engaged upon, is fully recognised on every railway, though only in certain cases are organised arrangements in regard thereto in force. Special interest attaches, however to the "Suggestions Bureau" which has been set up at Euston for the receipt and consideration of staff suggestions, in that it is to be operated in conjunction with the Central Office, and includes several interesting and more or less novel features, as explained fully in a circular letter issued under the signature of Josiah Stamp. In reference thereto Sir Josiah Stamp remarks:—

I am convinced that there exists throughout the service a live and deep-rooted interest in the general welfare of our railway, coupled with a sincere desire to give to the public the best transport facilities possible. Men are, I know, constantly in search of new and better methods of conducting their own work. I am also sure that this interest is not limited to their own particular domain, but reaches over the whole range of railway operations with which they have acquaintance. This desire on the part of the staff to serve both the railway industry and the community, and their proved capacity to do so, will receive every encouragement from me, and, indeed, it is my earnest hope that these qualities, wherever they exist may be firmly harnessed with the activities of the company's managerial officers. Such a combination will demonstrate that good team work can be made effective on our railway as on the sports ground, or elsewhere.

Suitable awards will be made in respect of suggestions which are considered useful or meritorious, irrespective of whether the suggestion is eventually put into operation or not.



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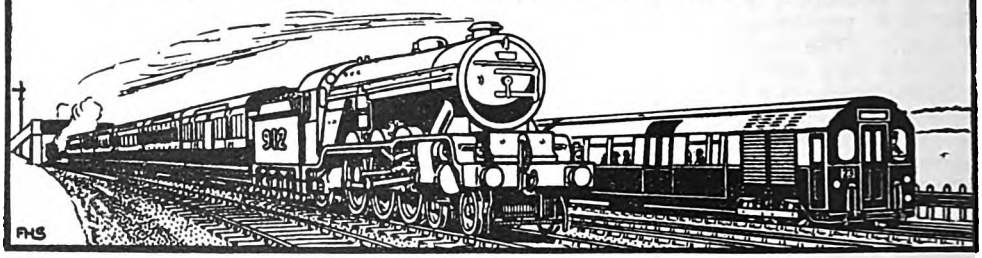
WHAT THE RAILWAYS ARE DOING.



We are officially informed that the Directors of the London & North Eastern Railway Company have made the following appointments :—

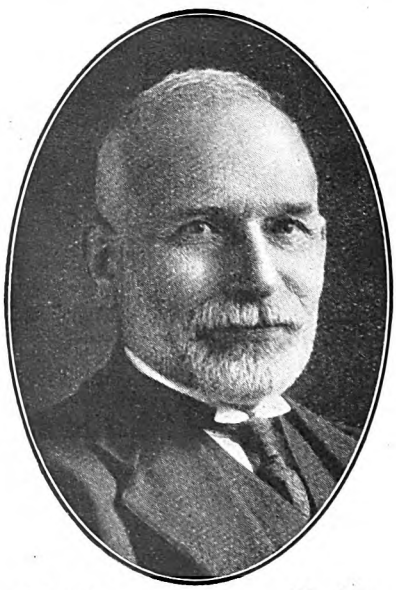
Mr. J. T. Naisby, hitherto District Goods Manager at Newcastle-on-Tyne, to be Passenger Manager for the North Eastern Area in succession to Mr. C. A. Lambert, who recently resigned in order to take up the position of General Manager of the Bolsover Colliery Company.

Mr. Paul Gibb, Assistant to the Divisional General Manager for the North Eastern Area, to be District Goods Manager at Newcastle-on-Tyne, in succession to Mr. Naisby.

Mr. C. F. Slade, District Engineer, Cambridge, to be District Engineer, King's Cross, in succession to the late Mr. F. W. Hunt.

Mr. W. E. Blakey, Assistant District Superintendent, Newcastle-on-Tyne, to be Staff Assistant to the Superintendent, North Eastern Area, in succession to Mr. J. S. Boyd, who recently resigned in order to take up an appointment as Secretary of the Shipbuilding Employers' Federation.

Mr. E. M. Rutter, Assistant District Superintendent, Middlesbrough, to be Assistant District Superintendent, Newcastle-on-Tyne, in succession to Mr. Blakey.



Lafayette [*Manchester.*

MR. J. T. NAISBY,

Appointed Passenger Manager, North Eastern Area, L.N.E.R.

* * *

Mr. J. T. Naisby, who has been appointed Passenger Manager, North Eastern Area, L.N.E.R., in succession to Mr. C. A. Lambert, has held the position of District Goods Manager, Newcastle-on-Tyne, since 1923. He was educated at Morpeth Grammar School and commenced as a junior with the North Eastern Railway Company at Morpeth station. After a few years' training in the various sections of the Traffic Department at different stations in the Northern Division, he was transferred to the Divisional Goods Manager's office, Newcastle, as personal clerk to the manager. In April, 1898, Mr. Naisby was appointed Chief Clerk to the District Traffic Agent at Carlisle, and in October of the same year joined the staff of the General Goods Manager at York. On the reorganisation, in January, 1901, he was given an important position in the newly created General Traffic Manager's office, and later was attached to the General Superintendent's office. In October, 1905, he was appointed Dock Agent at Tyne Dock, and on the retirement of Mr. Joseph Fairless, Mineral Manager at Newcastle, was transferred to the position of Assistant District Goods Manager, with special supervision of the heavy mineral traffic in that area and shipping at the various ports in the district. Mr. Naisby was appointed District Goods Manager at Middlesbrough in January, 1914.

* * *

Mr. J. R. Brooke, C.B., Permanent Secretary of the Ministry of Transport, has been appointed Secretary to the Central Electricity Board. The Minister of Transport has appointed Mr. C. W. Hurcomb, C.B., C.B.E., Principal Assistant Secretary of the

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Ministry of Transport, to be Permanent Secretary of the Ministry of Transport in place of Mr. Brooke.

* * *

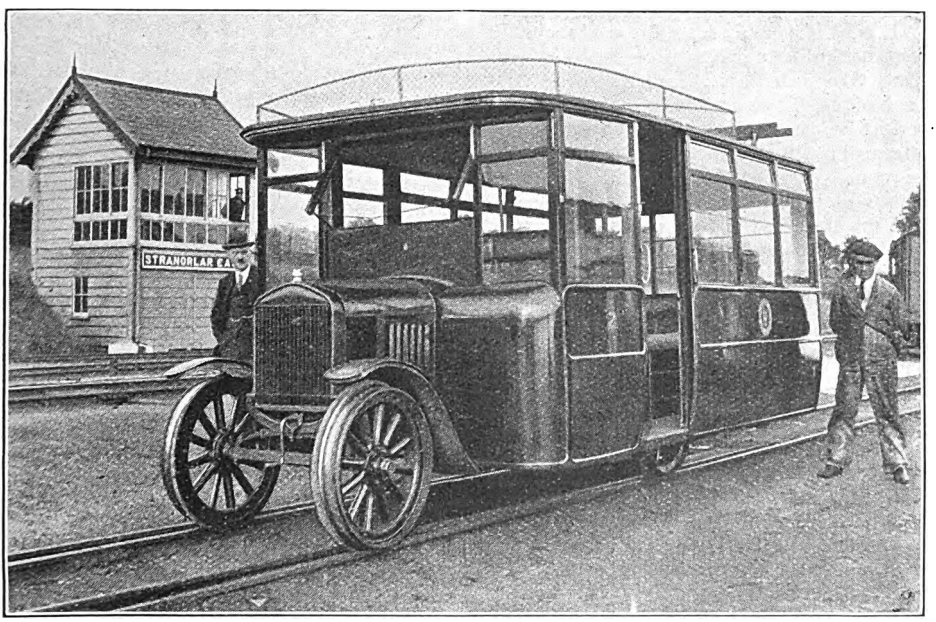
MR. CHARLES BLACKBURN DUNLOP, who died recently at the age of 84, was at one time Assistant Engineer of the Metropolitan Railway, under Sir John Fowler, in 1864. In 1870 he was employed in Hungary on the construction of the Hungarian Eastern Railway, and two years later he was appointed District Engineer in the Public Works Department of the Nizam of Hyderabad. In 1884 he was transferred to the Nizam's Guaranteed State Railway Company, subsequently becoming Chief Engineer and retiring in 1904.

* * *

AN exhibition of Arts and Crafts, organised by the Great Western Railway Social and Educational Union, was opened by Viscount Churchill, G.C.V.O., Chairman, at Paddington Station, on March 31. There were nearly 509 exhibits (including oil paintings, water colours, black and white sketches, models, &c.), all of which were executed by members of the G.W.R. staff. The exhibition was held in the General Meeting Room, and was open free to the public.

* * *

THERE was an excellent gathering of the members of the London Section of the Permanent Way Institution in the Staff Dining Room at Waterloo Station, London, on March 14, when Mr. Charles Travis, M.Inst.T., Associate Editor of *The Railway Gazette*, read a paper, illustrated by lantern slides, on "The Railways of Australasia," with special reference to Permanent Way and Works. In the absence of the President, Mr. A. Newlands, Chief Engineer, L.M.S.R., the chair was taken by Mr. A. W. Szlumper, Chief Engineer, Southern Railway, and among those present were Mr. E. A. Wilson, Engineer, Metropolitan Railway, Messrs. R. Carpmael and E. G. G. Matheson, Assistant Engineers, Great Western Railway, Mr. E. A. Treacher, Southern Railway, and Mr. Nugent M. Clougher.



RAIL MOTOR-CAR, COUNTY DONEGAL JOINT RAILWAYS.

* * *

"GETTING ready on the East Coast" is the title given to a finely coloured quad royal poster, just issued by the London and North Eastern Railway Company. It is by Mr. Frank H. Mason, R.B.A., who very cleverly indicates the activity now in evidence in certain yachting centres in the Eastern coastal areas in connection with the forthcoming summer holiday season. The prospective holiday-maker is advised to "ask now for free booklet at any L.N.E.R. office or agency." As the title indicates, this particular poster has been issued as a forerunner to the railway company's general

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display of new bills, mostly issued about the end of March.

* * *

BEFORE the end of the year the eight lifts at Holborn and Leicester Square stations, London Electric Railway, will be running at a speed of 290 ft. per minute, compared with the present speed of 180 ft. Improved equipment now being installed will bring about this change and will enable a much closer interval lift service to be provided. Consideration is now being given to the installation of high-speed lifts at other busy points on the "Underground" system, where the shafts are rather too deep for escalators.

* * *

THE L.N.E.R. "Flying Scotsman" recently did a remarkable performance with a load weighing 375 tons and hauled by Pacific engine No. 4479, *Robert the Devil*. It was stopped at St. Neots owing to a slight defect in a steam-heating connection between two of the coaches. Despite a dead stand of 3 mins., which involved a loss of fully six or seven minutes in the running time, Driver Parker brought his train into Grantham 3 mins. before time. Maximum speed was 81 m.p.h., between Abbot's Ripton and Holme. Leaving Grantham punctually, engine No. 4476, *Royal Lancer*, gained further time, reaching York 3 mins. early.

* * *

COMMENTING upon the reference in the December number, on page 496, to the Shropshire and Montgomeryshire Light Railway, Mr. P. R. Gale points out that the Potteries, Shrewsbury and North Wales Railway (now Shropshire Railways), does not terminate at Llanymynech, but after running over 2 chains of the G.W. (Cambrian Section) line at that place, goes on to the limestone quarries at Nantmawr (3 miles 67 chains from Llanymynech). The Llanymynech-Nantmawr branch had been operated by the Cambrian Railways Company since 1886, and was taken over by the G.W.R. in 1922 with the rest of the Cambrian system.

* * *

LIEUT.-COLONEL A. H. L. MOUNT'S report on the accident which occurred at Roudham turnpike level crossing, on October 27, has been issued. A motor lorry was run into while passing the level crossing by a down special goods train from Peterborough to Yarmouth. The train was worked by 0-6-0 locomotive No. 7613. The accident occurred at about 10.5 p.m. Responsibility generally is placed upon the gatekeepers, though the inspecting officer comments upon the fact that the level-crossing equipment here was out-of-date, and recommends that as "existing conditions are dangerous they should not be permitted to continue."

* * *

LIEUT.-COL. HALL'S report to the Ministry of Transport in regard to the collision which occurred on February 5, near Paragon Station, Hull, has been issued. An L.M.S. excursion train from Halifax, drawn by 4-6-0 locomotive No. 136, came into side collision with a passenger train from Hornsea, L.N.E.R., drawn by 0-4-4 tank engine No. 1703, opposite Park Street signal box outside Paragon station. A certain amount of damage was done, but no passenger received other than minor and comparatively trifling injuries. The accident is attributed to the misreading of signals by the pilot driver who was accompanying the L.M.S. enginemen. The inspecting officer suggests that this accident was of the class which might have been prevented had automatic train control been installed.

* * *

LIEUT.-COL. HALL'S report to the Ministry of Transport on the collision which occurred at 5.29 a.m. on January 26, at Fenchurch Street station, L.N.E.R., has been issued. L.N.E.R. 2-4-2 tank engine No. 7238, running light, came into head-on collision with an L.M.S. train from Southend drawn by 4-4-2 tank engine No. 2149. The light engine was running on the middle road between Nos. 3 and 4 platforms at Fenchurch Street, due to the fact that the disc signal giving authority for the light engine to travel beyond the protecting rail-scotch on the middle line (pushed to one side by the engine) was showing clear. There was at the time no detection between this disc signal and the rail-scotch, a matter which has since been corrected. The enquiry fails to establish how it became possible for the disc signal to show clear incorrectly, the only suggestion being that, under certain conditions, the signal could be pulled off by contact between its own and an adjacent wire. Fortunately, the accident was a slight one, though 10 passengers in the Southend train complained of minor injuries or shock.

* * *

REFERRING to remarks on page 333 of the April number, Mr. G. S. Moore suggests that J. F. Wake's rebuild number for the engine *Gowrie* is 1526 not 1516. He also mentions, among other engines noted in Mr. Wake's sidings at Darlington, Central London Railway steam locomotives Nos. 1 and 2 built by the Hunslet Engine Company in 1899, Manning Wardle engine built in 1887 (Works No. 1006), named *Gelli*, and late G.N.R. locomotives Nos. 526, 576A, 795, and 250A. Another engine of the same class

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Photo.] **DOUBLE-DECKER TRAVEL ON A PARIS SUBURBAN LINE.** [*The Times.*

THE photograph reproduced, taken outside the Gare St. Lazare, shows the manner in which the French State Railways are enabled to handle some of the dense suburban traffic centring on Paris. It will be noticed that increased capacity is secured by the use of double-decked vehicles, which are also employed by the Est Railway Company.

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is now working at Seaton Delaval Colliery, while the Cramlington Colliery have a 2-6-0 which came originally from the Midland and South Western Junction Railway.

* * *

THE Baltimore & Ohio Railroad is this year celebrating the hundredth anniversary of the granting of its charter. This was celebrated at Baltimore on February 28 by a dinner and historic tableau, invitations being accepted by some 800 persons. A souvenir medallion was issued, one side showing Peter Cooper's "Tom Thumb" locomotive and the other a design intended to indicate "Safety, Strength and Speed."

* * *

EVER ready with novelties, the "Underground" publicity department is now exhibiting a poster of outstanding interest, especially to Londoners. It depicts an aerial map of Central London (taken by Aerofilms Limited) from an altitude of 10,000 ft. The map is to a scale of 11·25 in. to the mile and covers an area of 8 square miles. We understand that 477 separate photographs were necessary to make it, and each view has been taken from a point as nearly vertical as possible. The positions of the 41 "Underground" stations in the area shown are indicated by red dots.

* * *

OF the 1,600,800 weekly season tickets issued by the London Midland & Scottish Railway during last year, 425,800 were issued in the London area, 93,100 on the Tilbury Section, and 257,800 in the Birmingham area, while the Manchester and Liverpool areas accounted for 240,300 and 141,200 respectively. In other large industrial areas Leicester L.M.S. weekly season-ticket holders numbered 38,300, Bradford 62,400, Leeds 18,300, and Nottingham 24,100.

* * *

LIEUT.-COLONEL A. H. L. MOUNT'S report on the two collisions which occurred at Orgreaves, on the Great Central section, Southern Area, L.N.E.R., on December 13, has been issued. A goods train from Mexboro' to Woodford, drawn by 2-8-0 locomotive No. 6358, was run into in rear by a goods train from Dewsnap to Nottingham, drawn by 4-6-0 locomotive No. 5053. Several wagons of the latter train were derailed, damaged and thrown foul of the adjoining up line, and were almost immediately run into by a miners' train from Sheffield, drawn by 4-4-2 locomotive, No. 3280. The report is mainly concerned with the application of rules requiring the placing of detonators behind goods trains brought to a stand in ordinary weather or when there is fog or falling snow, and the conditions under which the first collision occurred. The report suggests that the circumstances afforded evidence of considerable laxity in regard to compliance with the regulations applicable.

* * *

COMMENTING upon Mr. G. A. Sekon's article on "The Flushing Steamer Service," published in the March number, Mr. H. D. Hewitt points out that in February, 1899, the King's Ferry swing bridge over the Swale partially failed, and during the time that it was under examination and temporary repair, the L.C. & D. Flushing boat trains ran to Port Victoria, via the North Kent line. This was nearly a year before the second fire on Queenborough Pier. Subsequently, the Swale Bridge was replaced by the Scherzer rolling lift bridge.

* * *

WE regret that owing to a clerical error in transcribing particulars, the photograph showing a down Bristol and South Wales express, drawn by 4-6-0 locomotive No. 2949, *Stanford Court*, reproduced on page 290 of the April RAILWAY MAGAZINE, was credited to Mr. W. Leslie Good, whereas the block was made from one of Mr. Henry L. Salmon's photographs. Also that the initials of the photographer whose views on Continental railways were reproduced on page 318 of the April number should have been given as M. T. Minshall.

* * *

BRIGHTON station, which during 10 weeks of the summer season deals with between two and three million passengers, is to be reconstructed at a cost of roughly £90,000 and work will be started immediately.

* * *

COMMENCING March 31, the Southern Railway Continental service from Waterloo at 9.0 p.m. via Southampton and Havre was accelerated to give an arrival in Paris at 10.32 a.m., a gain of 84 mins.

* * *

THE L.N.E.R. is introducing illuminated station name boards at stations.

* * *

The following appointments have been approved by the directors of the L.M.S.R.:—

Chief Mechanical Engineer's Department.

Mr. S. J. Symes to be Works Superintendent, Midland Division, Derby.

Chief General Superintendent's Department.

Mr. E. Woodhouse to be Station Master and Goods Agent, Clitheroe.

Mr. J. A. Orme, of Crewe, to be Station Master, Warrington.

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Mr. H. A. Hosking to be District Controller, Barrow.

Scotland.

Mr. W. Mather, of Inverness, to be Passenger and Parcels Agent, Edinburgh (Princes Street).

* * *

THE "Underground" Lost Property Offices are now located at Victoria station, for articles lost on the District Railway, and at Chancery Lane station for anything left behind on the tubes.

* * *

THE L.N.E.R. announce that during the week ended March 26 the tonnage exported from Middlesbrough Dock was 22,899, as against the previous record of 18,634 tons during the week ended December 15, 1923. The exports thus easily constitute a new record.

* * *

THE Minister of Transport has recently made the following Order :—London Midland and Scottish and Great Western Companies (Avonmouth Light Railway Transfer and Amendment) Order, 1927, transferring the Avonmouth Light Railway to the London Midland and Scottish and Great Western Railway Companies, extending the period limited for the completion of the light railway, and for other purposes.

* * *

IN connection with various experiments in progress, two cars of a train working on the Hampstead section of the London Electric Railway have been fitted up with loud-speaker equipment. The guard has a mouthpiece into which he speaks, giving information as to next station, connections which can be made there, and injunctions to mind the doors, &c, as circumstances may demand. One of the two cars fitted has a circular horn speaker placed under the roof, while the other has a double-mouthed rectangular speaker from which the sound waves emerge longitudinally in each direction. A switch enables the guard to connect or disconnect the mouthpiece as desired, while tests are being made to enable the same equipment to be used for communication between guard and driver.

* * *

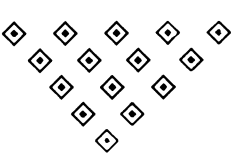
THE directors of the L.N.E.R. have authorised the construction of 259 passenger carriages, restaurant cars, brake vans and mail vans for their various services. The L.N.E.R. vehicles already in service which have been constructed on the articulated principle have proved so successful that four trains composed of quintuple units, eight trains consisting of quadruple units, as well as three triple sets of restaurant cars, are to be constructed for the Company's services. By the provision of electrical charging facilities at various important centres. the all-electric cooking restaurant-car services will be extended.

* * *

Two additional 2-6-0 mixed traffic engines have been turned out at Crewe unpainted, Nos. 13042-3. Latest 0-6-0 ex Kerr, Stuart & Co. is No. 4307. The recent Crewe-built 0-6-0's (series 4302-11) are being withdrawn for painting. 0-6-2T No. 7835 (old No. 2352) has been adapted for working motor trains and is at present stationed at Crewe North shed. 4-4-0 compound No. 1944, *Victoria and Albert*, and 6 ft. 6 in. 2-4-0 No. 1678, *Airey*, have been withdrawn from service. No. 1974, *Howe*, is the only passenger compound now left, and will be recognised as the one that was experimentally converted to a superheater in 1921. At Horwich the new 2-6-0's are completed up to No. 13019, and four others are at present in course of construction. Ten only of the Midland Division 4-2-2 singles remained at the end of 1926, viz., Nos. 600, 633, 638, 640, 641, 645, 649, 669, 673, and 679.

* * *

MR. J. F. GAIRNS, Editor of *The Railway Magazine*, addressed the members of The Railway Club on Monday, April 11, on "The Importance of Secondary Trains." References to through-carriage and through-van workings on semi-fast main-line trains and other complexities of traffic operation gave rise to an interesting discussion. Particulars of forthcoming arrangements are given in our advertising pages.



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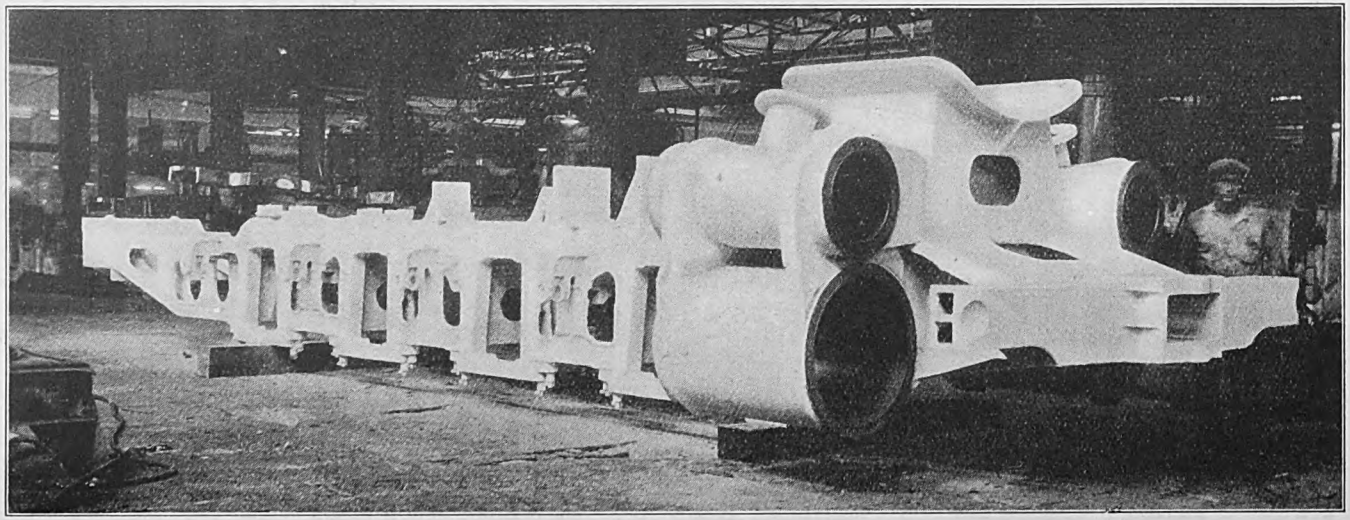
LOCOMOTIVE CYLINDERS, STEAM CHESTS, SMOKEBOX SADDLE AND FRAMING IN ONE STEEL UNIT CASTING.



For some years past the Commonwealth Steel Company of America has been manufacturing heavy locomotive framecastings, but it was only recently that they produced a complete locomotive chassis, incorporating the main frames, brackets, bracings, end plates in one piece with the cylinders, steam chests and smokebox saddle.

The engines for which the castings were required are of the 0-8-0 type with eight-wheeled tenders, to be used for shunting and transfer service in the vicinity of St. Louis. The solid one-piece under-frame with integral cylinders, &c., is claimed to have special advantages, as compared with the ordinary built-up locomotive bed.

The framing of the tender is also cast integrally of steel.

The eight-wheeled shunting locomotives fitted with the engine and tender frames described are among the largest eight-wheeled shunting locomotives ever built. They have cylinders measuring 26 in. diam. by 28 in. stroke. In working order the engine weighs approximately 110½ tons.

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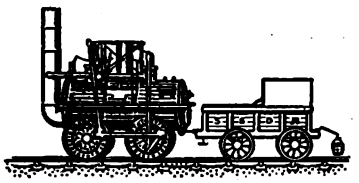
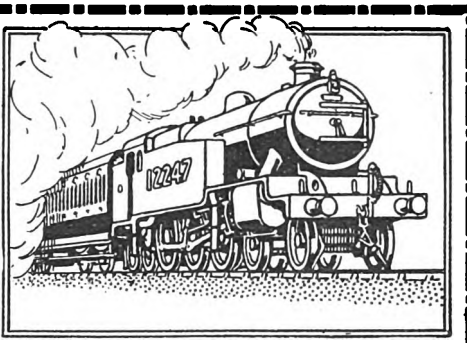
LOCOMOTIVE MATTERS





Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

New class "4" 0-6-0's Nos. 4401 and 4403 have been noted at Shrewsbury. Midland section 0-6-4T No. 2051 sometimes works into Shrewsbury on the 3.14 p.m. train from Stafford.—[E. R. JUDGE.]

Midland section 2-4-0 No. 93, recently reported by a correspondent as having been scrapped, has been noted since on a passenger train at King's Norton.—[R. JOHNSON.]

New mixed traffic 2-6-0 No. 13035, from Longsight shed, has been working a Manchester–London express goods via Macclesfield, Leek, Uttoxeter, and Moira Junction. Two "direct motion" "Princes," Nos. 964 *Bret Harte*, and 867 *Condor*, stationed at Camden, have been renumbered 5638 and 5672, respectively.—["MOONSTONE."]

The 10.15 p.m. New Street to Crewe express is being worked by Midland type engines from Saltley shed, Birmingham. New 2-6-0 No. 13039 has been seen at Camden shed.—[J. MACARTNEY ROBBINS.]

"Claughton," No. 150, *Illustrious*, is now 6011, and is at Longsight (16) shed. 18-in. "goods," Nos. 47 and 8512 (originally 39), are fitted with Belpaire boilers, and are stationed at Burton (L.N.W.) shed. Midland 0-6-0's Nos. 3689 and 3814 have been seen recently, fitted with Belpaire boilers, the former bearing the plate "Rebuilt Derby, 1927," and the latter "Rebuilt Derby, 1923." Superheated "Precursor," No. 5292 *Medusa*, reported in the February RAILWAY MAGAZINE as working into Carlisle, was seen at Stoke on March 19. Superheated "Precursors" now stationed at Stafford are Nos. 127 *Snake*, 1137 *Vesuvius*, and 2164 *Oberon*; "Precursor" (unsuperheated) Nos. 1 *Clive*, 40 *Niagara*, 229 *Stork*, 754 *Celtic*, and 2181 *Eleanor*. "George the Fifth" No. 1725 *John Bateson* is also there. N.S.R. 0-6-4 tank No. 2051, formally at Stoke, is now at Stafford.—[NIAGARA.]

New 2-6-0 No. 13009 has worked into Manchester (Victoria) recently.—[G. C. WILSON.]

Midland type 4-4-0 compound No. 1185 worked the L. & Y. 8.45 a.m. Manchester (Victoria) to Blackpool express on a recent date.—[W. H. A. JAMESON.]

Locomotives noted working L. & Y. trains in the Blackpool district include:—L.N.W. "Princes" Nos. 5842 (painted black with the L.M.S. crest on the rear splashers and a plain tender), 233 *Suvla Bay*, 614, and 362 *Robert Southey*; "Precursor" No. 2580 *Problem*; and L.M.S. standard 4-4-0 compounds Nos. 1185, 1186 and 1188.

L. & Y. 0-8-0 No. 12739 has been noted at Blackpool fitted with "Dabeg" feed-water heater, similar to the heaters with which 4-6-0's Nos. 10432–4 are equipped.—[G. R. A. TYSON.]

2-4-0's Nos. 5102 *Cuckoo*, and 5108 *Wyre*, from Workington shed are to be seen on duties between Workington, Penrith, Whitehaven, and Workington, Cleator Moor and Whitehaven. Carnforth shed 4-4-0's Nos. 10137, 10138, 10139 often work through to Carlisle and back next day (via Whitehaven).—[J. L. SUTCLIFFE.]

Midland section tank No. 1654 is working in Carlisle North sidings. New compound No. 1189 worked a Fleetwood train to Manchester (Victoria) on March 11.—[R. DYSON.]

Caledonian outside-cylinder 4-6-0's of the "60" class have been seen at Carlisle, Western Division shed, Preston and Springs branch.—[J. MACARTNEY ROBBINS.]

L.N.E.R.

The new 2-8-2 locomotives are working between Hornsey and Peterborough. Several

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class "N2" 0-6-2T's, including Nos. 4615, 4731, 4732, 4743 and 4749 are fitted with the Westinghouse brake and combination valve for working vacuum-fitted trains, while class "N1" Nos. 4581 and 4589 are fitted with separate apparatus for both types of brake.—[R. LUCAS.]

On Saturday, March 5, N.E. 4-6-0's Nos. 782 and 2114 and 4-6-2 No. 2562 *Isinglass* worked into King's Cross.—["ABERDONIAN."]

On a recent Sunday, G.C. 4-6-0 No. 6166 *Earl Haig* worked the 5.30 Marylebone–Manchester express. Previously this and all other expresses to and from Marylebone have been worked by "Directors" or "Atlantics," the "Valour" class engines having been employed on the G.N. section recently.—[B. K. COOPER.]

Additional N.E. locomotives noted on the G.E. section include 4-4-0's Nos. 1540, 1880, and 1929; 0-6-2T's Nos. 865, 866, 867, 868, 870 and 873; and 0-6-0's Nos. 1017, 1024, 1034 and 2361.

The following are the numbers of the 19 0-6-0T's of class "J50" recently completed at Doncaster; Nos. 583, 586, 588, 589, 591, 593, 594, 596, 601, 603, 609, 610, 616, 617, 618, 621, 622, 635 and 636. Information is asked regarding the numbers of the 13 4-6-2T's of the "1712" batch built by Hawthorn Leslie & Co.—[J. G. BROWN.]

G. N. Booster fitted 4-4-2 No. 4419 is working in the West Riding district. G. C. "Director" 4-4-0 No. 5511 *Marne* has been working the Harrogate and Edinburgh Pullman on alternate days.—[794A "RIVER ROTHER."]

G.C. 4-2-2 No. 5972 has been stationed at Southport C.L.C. for six months and works to Manchester (Central) or Hunts Cross. An example of coincidence in engine numbers occurred during Altcar "Coursing" week. The first regular train into Southport C.L.C. from Manchester was worked by No. 5853 on February 14, 5854 on February 15, and 5855 on February 16. Further, on February 17 the train was hauled by No. 5855 and the two succeeding "Coursing" specials by Nos. 5856 and 5857.—[W. E. BOWKER.]

Another example of coincidence in engine numbers was the following arrival of C.L.C. trains at Manchester (Central) on March 16: 9.9 p.m. in from Southport hauled by No. 5868, 9.15 p.m. in from Liverpool, No. 5869, and the 9.15 p.m. in from Northwich, No. 5870. The engines are all G.C. section "Pollitt" 4-4-0's. G.E. 4-4-0 No. 8899 has been working Liverpool expresses and Chester trains to Manchester on the Cheshire lines recently. C.C. 4-6-0 No. 6166 *Earl Haig* worked to Manchester Central on a recent occasion. Before the amalgamation it was not unusual to see the six engines of this class, from Gorton shed, in Manchester at the same time, though since their transfer to the G.N. section they are seldom seen in the Manchester area. N.E. 4-6-0's Nos. 821 and 2368 recently visited Manchester.—[R. DYSON.]

G.W.R.

In addition to the four-cylinder 4-6-0's previously mentioned as being stationed at Cardiff, 4030 *King Harold* and 4042 *Prince Albert* are now there.

All the new 0-6-2T's are in service, No. 5699 being seen at Cardiff Docks on February 12.

2-8-0 tender engines Nos. 2809 and 2851 have been noted at Quaker's Yard (Taff Vale Section).

4-4-0 No. 3826 *County of Flint* is stationed at Newton Abbot, an unusually westerly depôt for a "County."

"City" Class 4-4-0's stationed at Bristol include Nos. 3700 *Durban*, 3707 *Malta* and 3716 *City of London*.

Carmarthen Shed now has a 4-6-0 stationed there—"Saint" class No. 2902 *Lady of the Lake*. The statement that "Bulldog" class 4-4-0's work into the Cardiff Docks area, which appeared in the March issue, is apparently a misunderstanding, as the only G.W.R. tender engines working on any of the local lines in the Cardiff area are 0-6-0's, with, perhaps, an occasional 2-6-0 or 2-8-0, but certainly no passenger engines.—["TALISMAN."]

2-8-0T's now frequently work into Shrewsbury from South Wales. The following have been noted: Nos. 4201, 4212, 4218, 4221, 4226, 4228, 4252, 4256, 4267, 4278, 4284, 5200, 5203, 5252, 5255, 5256, 5265, 5267, 5274. "Saint" class 4-6-0's Nos. 2915 *Saint Bartholomew*, 2924 *Saint Helena*, 2926 *Saint Nicholas*, 2952 *Twineham Court*, 2975 *Sir Ernest Palmer* and 2989 *Talisman* are shedded at Shrewsbury. Nos. 2915, 2924, 2975 and 2989 are fitted with cab-signalling apparatus. Four-cylinder 4-6-0's Nos. 4021 *King Edward* and 4075 *Cardiff Castle* are stationed at Bristol.—[E. R. JUDGE.]

S.R.

S.E. & C. class "D" 4-4-0 No. 741A has been rebuilt as "D1" class, and fitted with Ross "Pop" safety valves. The 10 a.m. Victoria and Dover boat express has been worked recently by 4-4-0's, including new "L" class No. 759A and locomotives of the "D1" and "E1" classes instead of by "King Arthurs." New "L" class noted at Longhedge include Nos. 755A, 759A, and 783A. "K" class 2-6-4T's, including Nos. 795A *River Medway*, 808A *River Char*, and

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809A *River Dart* have been noted on trains working into and out of Victoria, Eastern section. L.B.S.C. 0-6-0's Nos. 448B, 549B, and 0-6-0T No. 159B were seen at Longhedge. 0-6-0's Nos. 532B and 552B were noted recently on a down goods train at Herne Hill. Stroudley 0-4-2 No. 619B worked the 10 a.m. Victoria to Newhaven boat express on a recent occasion. An S.E. & C. class "P" Wainwright 0-6-0T was observed at Battersea, Central section.—["SIR BORS DE GANIS."]

0-4-4T No. 666A takes weekly turns with No. 662A on the Sevenoaks–Otford motor trains. An L.B.S.C. section 0-6-0, with spring-balance valves on the dome was observed at Hither Green sidings.—[R. N. G. BELLWOOD.]

New 4-4-0's Nos. 757A and 759A are now working Dover–Faversham local trains alternately. One of these trains consists of a close-coupled set of L. and S.W. section suburban coaches, which sometimes work through to London. 0-6-2T's Nos. 408–9B have worked special coal trains to Gillingham (Kent). Small Wainwright 0-6-0T No. 556 (formerly No. 753), now at Battersea, was temporarily stationed at Gillingham, and is the first of the class noted in this district.—[G. E. FENTON and L. J. SLATER.]

Since the larger turntable has been installed at Reading, all types of L.S.W 4-4-0's, including Nos. 141 and 440, 398, and many rebuilt engines of the "700" class, now work the bulk of the Western section passenger traffic into Reading. 0-4-2's and 0-4-4T's of this section, once quite common in this area, are now seldom seen.—[R. WEBSTER.]

Latest L.S.W. superheated 4-4-0 is No. 731E, at Guildford. No. 567E is fitted with a Drummond type boiler.

There are 272 4-4-0's on the S.W. section, of which 15 are in the duplicate list. None of Mr. Adams 4-4-0's of the "0380" 5-ft. 7-in. class and "0445" 7-ft. 1-in. class are now running. The following small superheater 4-4-0's are at Guildford, Nos. 116E, 284E, 286E, 722E, and 731E. 2-6-0's 846A, 847A, 830A, 861A, 874A are at Feltham and work goods trains to Reading, Guildford, Willesden, Brent, &c. L.S.W. 4-4-0's Nos. 137E, 150E, 345E, 388E, and 394E work the Reading services, in turn with the Stirling 4-4-0's. They also work on Windsor line duties. Nos. 134E, 149E, 175E, 440E, 441E, and 0-6-0 No. 690E on Windsor trains, and Nos. 126E, 344E have also been noted, together with 0-4-2's Nos. 544E, 547E, 555E, 625E, and 649E on Reading services.—["745 TINTAGEL."]

Adams 0-6-0 No. 0439E and Drummond 0-6-0's Nos. 696E and 309E are now working between London, Guildford and Portsmouth; also Drummond 4-4-0's Nos. 725E and 286E, Drummond 4-4-0 No. 116E, and Drummond Nos. 472E and 467E. Most of the Adams 0-4-4T's have now been taken off, and the small 4-4-0's have been put in their places.—[M. PULLMAN.]

In connection with the recently-instituted services of push and pull trains in the Bournemouth district, a number of fresh locomotives, including Drummond 0-4-4T's Nos. 36E, 52E, 110E, 241E, 242E, 249E, 250E, and 375E have been stationed there. "King Arthur" class 4-6-0 No. 806E *Sir Galleron* was recently noted at Bournemouth on a down London express. 0-4-4T No. 362E has now left the Bournemouth district. 4-4-2T No. 054E is stationed at Bournemouth, and performs shunting duties at the West Station. Seven engines, Nos. 050E, 054E, 0125E, 0517E, 0520E, 0522E, and 0486E, are the only survivors of this well-known and once numerous class. No. 0125E is fitted with a Drummond boiler, and is in the Exeter district.—[C. H. MOON.]

Brighton section 0-6-0T No. 655B has been noted at Eastleigh sheds recently. 0-6-2T No. 758E *Lord St. Levan* has arrived at Eastleigh for repair, while 0-6-0T No. 756E *A. S. Harris* has left the shops, unpainted.—[G. W.]

0-6-2T No. 757E *The Earl of Mount Edgecumbe* has been repaired and repainted recently at Eastleigh. There are now only eight Drummond 0-4-0T's. These are Nos. 82E, 83E, 84E, 101E, 147E, 0741E, 0744E and 0745E. Adams 4-4-0 No. 678E still retains the bright brass beading round the wheel splashers.—[M. B.]

S. & D.J.R.

0-4-4T No. 53 has lately worked into Bournemouth on an afternoon local train. She is stationed at Bath and is of the "1P1B" class. The afternoon goods from Poole to Templecombe is always worked by one of the "1P2B" class 0-6-0 goods engines. None of the 2-8-0's have worked into Bournemouth for some time now, as apparently the termination of the coal dispute has found work for them at Radstock.—[C. H. MOON.]

IRISH RAILWAYS.

The statement published in the February issue that G.S. & W. 4-4-0 No. 531 is stationed at Dublin, Canal Street shed, is incorrect. This engine may have been working from Bray shed. Any class of locomotive is now permitted to work over the Dundalk-Clones section, since the renewal of two viaducts at Newbliss. The large "D" class engines, however, are not allowed

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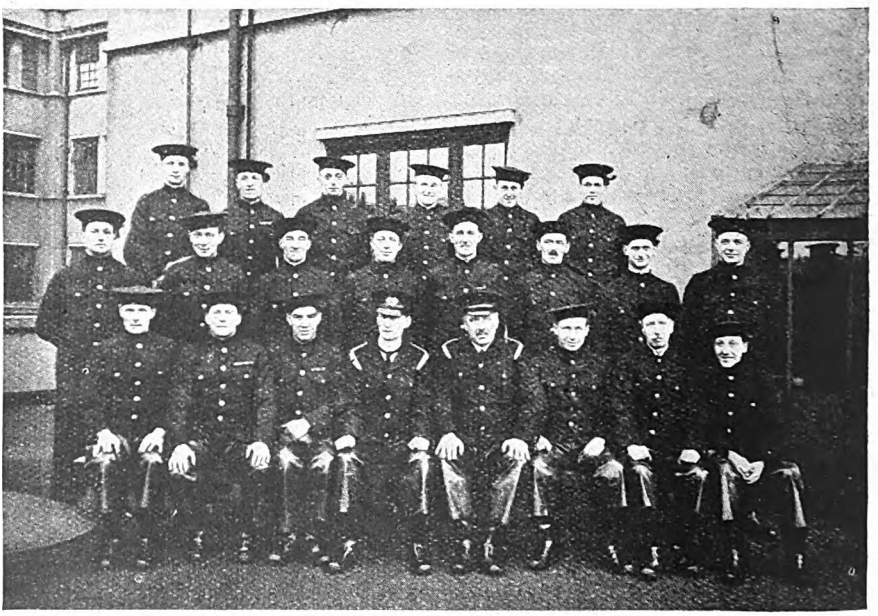
over the Dundalk-Dublin line until the Boyne Viaduct at Drogheda is renewed.—[J. J. KENNEDY.]

D.S.E. 2-4-0T No. 44 has left that section for repairs at Inchicore, as also has 0-4-4T No. 279. 4-4-2T No. 274 has now had the Kitson date plates removed, and it is apparently intended to take off the makers' plates from all G.S.R. engines constructed by outside builders. 2-4-2T No. 434 is up for repair, having broken a tyre at Dundrum. Woolwich-built 2-6-0 engines Nos. 378–382 are now in service, turned out from Broadstone works. No. 377 was lately running on the G.S. & W. section and worked the Rosslare boat expresses. Some more locomotives lately renumbered are:—428 (2-4-2T, D.S.E. No. 3), 452 (4-4-0, D.S.E. No. 57), 454 (4-4-0, D.S.E. No. 67 *Rathmore*), 457 (4-4-2T, D.S.E. No. 35), 609 (0-6-0, M.G.W. No. 71 *Galway*), 616 (0-6-0T, M.G.W. No. 102 *Pilot*), 621 (0-6-0 M.G.W. No. 98 *Caledonia*), 627 (0-6-0 M.G.W. No. 90), 634 (0-6-0 M.G.W. No. 40), 637 (0-6-0 M.G.W. No. 37), 640 (0-6-0 M.G.W. No. 43), 648 (0-6-0 M.G.W. No. 145 *India*).

At Bray, D.S.E. section, a new platform is under construction, to be ready for the heavy summer traffic, for which the old single platform has long been inadequate. Several lengths of this section have been relaid with G.S. & W. type track.—[K. A. MURRAY.]

HEADQUARTERS FIRE BRIGADE TOURNAMENT, METROPOLITAN RAILWAY.



On Thursday, April 7, the First Annual Competition between the four fire brigade teams, organised at the Metropolitan Railway headquarters at Baker Street Station, was held, Lord Aberconway (Chairman) and other Directors, Mr. R. H. Selbie (General Manager and Director), together with chief officers, being present. Mr. T. E. Mawby, Chief Fire Inspector of Messrs. Merryweather & Sons, acted as judge, and Mr. E. A. Wilson, Chief Engineer, Metropolitan Railway, as Timekeeper.

Team No. 2 was adjudged the winner team, beating team No. 4 by $3\frac{2}{5}$ sec. only. The challenge shield and medal awards by the company were afterwards presented by Lord Aberconway. On the following evening the members of the teams dined together in the Headquarters Office Dining Club, under the chairmanship of Mr. E. C. Short, Commercial Manager's Office, chief officer of the Brigade, supported by Mr. W. F. Smith (General Manager's Office), Second Officer.

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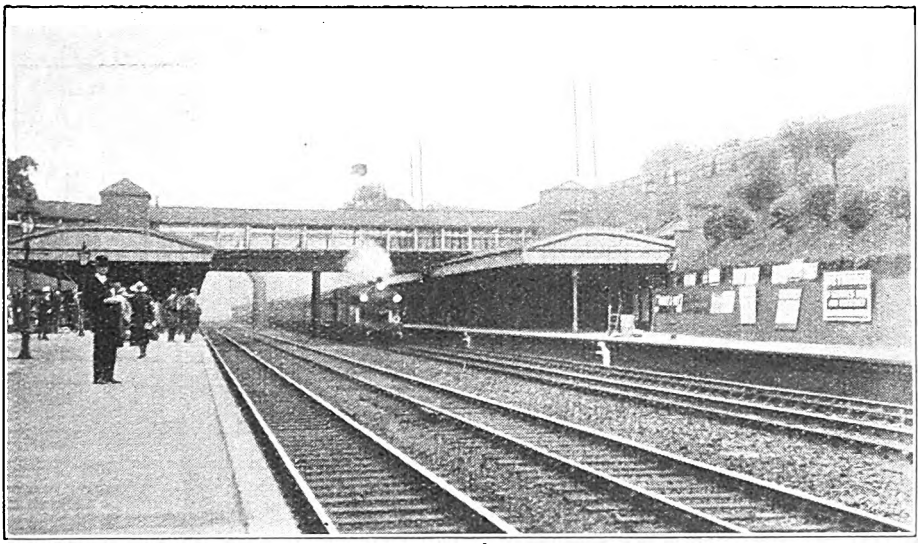

WEYBRIDGE STATION.

Some Lesser-known Sections of the Southern Railway.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

(*Photographs by the Author.*)

IT is somewhat peculiar that within a radius of less than fifty miles of London, and to a great extent within a range of thirty miles, a railway such as the Southern, and particularly so busy a section as that contributed by the late London & South Western Railway, should include quite a number of routes which are relatively little known, except, of course, by those who use them. It is true that most of the lines concerned are fairly busy and nearly all are double track. But the fact remains that lines such as those in the Aldershot and Ascot districts, and several others associated therewith, appear to be almost unknown to many people, even in London, and many sections can be little more than names to readers in other parts of the country. Hence, it is thought that a few remarks descriptive of some of these lines will be in order, illustrated by a series of photographs specially taken for this article.

To a great extent, the lines under notice constitute portions of the network of far-reaching suburban lines which constituted so valuable a preserve of the London & South Western Railway, though a section of the late South Eastern & Chatham Railway is also concerned. By way of introduction, it will be convenient to indicate how this network of lines was built up.

The various sections under notice were added to the original main line system as follows: Woking to Guildford, May 5, 1845; Clapham Junction to Richmond, July 25, 1846; Weybridge to Chertsey, February 14, 1848; Richmond to Datchet, August 22, 1848; Windsor station, December 1, 1848; Surbiton to Hampton Court, February, 1849; Farnham to Guildford, October 8, 1849; Hounslow loop line, February 1, 1850; Staines to Ascot, June 9, 1856; Ascot to Wokingham and Reading, July 9, 1856; Epsom to Leatherhead, February 10, 1859; Raynes Park to Epsom, March 4, 1859; Twickenham to Kingston, July 1, 1863; Shepperton branch, November 1, 1864; Alton to Alresford, October 2, 1865; Wimbledon

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to Tooting, October 1, 1868; Kensington to Richmond, January 1, 1869; Wimbledon to Kingston, January 1, 1869; Brookwood to Farnham, May 2, 1870; Ascot to Aldershot, June 1, 1879; Hampton Court Junction to Guildford, February 2, 1885; Wimbledon to East Putney, June 3, 1889; Brookwood to Bisley Camp, July 14, 1890; Basingstoke and Alton Light, June 1, 1901; Meon Valley line completed, June 1, 1903; Bordon branch, December 11, 1905.

As the Kingston and Hounslow loops, the Shepperton and Hampton Court branches, the Epsom and Leatherhead and Cobham routes to Guildford, the East Putney line and other sections of what may be termed the electrified suburban zone are fairly well known and for the most part have already received attention in these pages, it will be convenient to commence our survey of the other lines concerned from Twickenham and Surbiton. First, however, it may be pointed out, for the benefit of readers who do not know these lines, that from Waterloo there are, to all intents and purposes, two separate railways, with occasional inter-communication, and each carrying its own sections of traffic. The main line proper is four track all the way to Clapham Junction, with the fast lines in the centre, except for a section between Waterloo and Vauxhall, where there are three up lines to provide for the distribution of up trains with a view to the platform they have to reach at the terminus. The main lines, it is interesting to note, have no platforms at Queen's Road, Battersea, station, and at Vauxhall the down fast has no platform, though all other lines are provided with them. The four-track formation continues all the way down the main line to Worting Junction, beyond Basingstoke.

The Windsor route, served by the Windsor side of Waterloo station, has two down lines to Clapham Junction, with the exception of a short run of one line as between Loco. Junction (Nine Elms) and Queen's Road station. Two up lines are provided between Clapham Junction and Waterloo "C" Box, from which latter point to Waterloo Station one up line is provided. The four-track formation extends to Barnes where the Hounslow loop diverges. Normally, the fast lines are in the centre, but, more often than not, down fast trains, particularly those for Windsor and Reading, take the outside line so as not to interfere with a Hounslow stopping train on the inner line at Barnes. Up fast trains, however, may take either the inner or the outer line from Barnes, as most convenient. Through Richmond to Twickenham there is only one down line, but from Twickenham to St. Margarets there are two up lines, the outer serving, just north of Twickenham, a platform which is utilised when there are big football crowds to handle, as an alternative platform for up trains.

From Twickenham the Kingston "roundabout" line diverges at once to the left, with a flying junction for up trains, but Hounslow loop trains use the Reading and Windsor line for about $1\frac{3}{4}$ miles, to a point where a triangular connection is made with the loop. This triangle constitutes the Feltham Junctions, whereby goods trains to or from Feltham marshalling yards can travel to or from London via either Richmond or Hounslow, while electric trains on the loop service obtain the necessary connection between Twickenham and Hounslow.

Just beyond the Feltham Junctions a reservoir may be noted on the down side, and some powder mills to the right, but principal interest attaches to the now famous Feltham Yard, to and from which most of the goods traffic is worked, and, where required, re-marshalling is carried out with the aid of two groups of gridiron sidings, in conjunction with humps. There is also a big and modern engine shed.

The yard terminates at Feltham station, which has its own local goods yard on the up side. There is nothing calling for special remark through Ashford (Middlesex), except to mention that this, like most of the stations on the route, is a centre for considerable residential traffic, a fact which explains why so many of the trains on these routes are of a stopping character beyond Feltham or Ashford, or beyond Staines or Egham. Staines is the junction for the Windsor line. It has the usual two platforms only, but is on a rather sharp curve, so that non-stopping trains require to slacken considerably. Just beyond the station the Windsor line diverges sharply to the right, while the Reading line curves away to the left.

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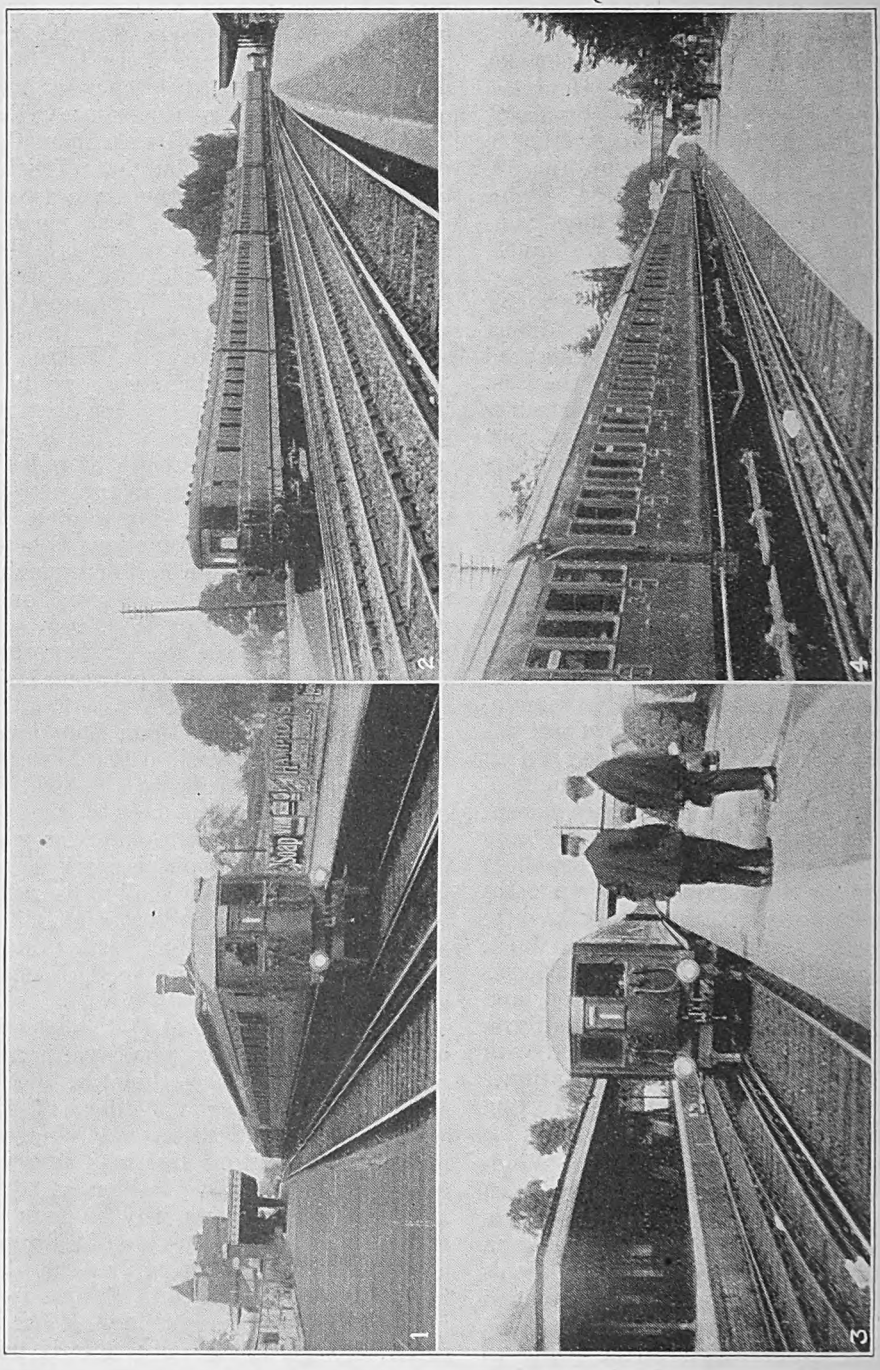

1. Dorking Train at Leatherhead.
2. Electric Train at Epsom.
3. Effingham Junction Train at Leatherhead.
4. Electric Train at Effingham Junction.

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There is a connecting line completing a triangle, so that trains can run direct between the Reading and Windsor lines, avoiding the station. This triangle, by the way, is controlled by one signal cabin in the centre, an equipment of low-pressure pneumatic signalling having been laid in some years ago to permit of this. An air-compressing plant is installed in a building adjoining the station on the up side.

Just beyond the further apex of the triangle there used to be a station known as Staines (High Street), but this has been closed and dismantled for some years, though it was handy for some parts of the town and was close to the Great Western station. A little further on the Great Western crosses overhead by a skew bridge, and before reaching Wraysbury station the River Colne is crossed. Further on a loop of the Thames comes in on the left-hand side, while the main river practically parallels the railway from Datchet to the point where the Thames is crossed. Thence the river is again alongside until the terminus is reached, close to Windsor bridge. In the summer this section of line is very pretty, there being many subsidiary waterways, overshadowed by foliage, while nearing Windsor good views are had of the craft on the Thames and to the left of the Home Park and Windsor Castle.

Returning to Staines, the Reading line crosses the River Thames just beyond the triangle, and then continues through pretty country to Egham (passing Thorpe Lane and Pooley Green crossings near the river bridge and Egham Causeway box), and on to the picturesque station at Virginia Water. Here there is another of the triangles of which the London and South Western Railway had so many. Approaching the station, sidings may be noted on the down side, available for reversing branch trains which come to Virginia Water from Weybridge. These trains have their own platforms at the station, but usually arrive at or depart from the up platform as being most convenient for interchange with Reading line trains. The third side of the triangle is beyond the station, but is not now much used. The Weybridge–Chertsey–Virginia Water line is now principally used by passenger trains working to or from Weybridge or to or from Waterloo by that route, but there used to be trains from Woking to Windsor via Addlestone and Byfleet Junctions, Virginia Water, and the Staines triangle. The connections are, however, still used for goods traffic, more especially since the development of Feltham as a marshalling centre. Virginia Water station is somewhat picturesquely situated. The signal-box is on the middle angularly-shaped platform. Adjacent to it is an ivy-clad building accommodating waiting room.

There is nothing of special interest between Virginia Water and Ascot, though the surroundings are picturesque as the line crosses Chobham Common, while to the right are the wooded hills and slopes of Windsor Great Park, adjacent to Virginia Water itself, about two miles away. The approach to Ascot is indicated by sidings, provided for the storage of empty trains as required when race meetings are in progress. The station itself is somewhat peculiarly laid out. The Reading up line is served by a platform on each side. The outermost communicates with the booking office, and other platforms are approached from it by subway. The next line was, presumably, put in to facilitate interchange of passengers between trains terminating at or starting from Ascot, though its principal usefulness now is to provide a platform for race specials when they are running. It connects with both up and down lines at the London end, but towards Reading it has a cross-over only to the Reading down line, otherwise leading to terminal buffer stops. It will be seen, however, that this platform can be used for reversing a terminal train clear of the through lines, and that there are connections enabling the engine to run round its train ; a down train can be brought to it to enable a through train to pass it and then continue its journey ; or an up through train can be backed into it to enable it to interchange passengers, via the platform between, with a through train from Reading at the up through platform. Besides these platforms, there are two lines for the Bagshot branch. Frequently this is operated by a " push-and-pull " train, and these generally arrive at or depart from the outer side of the platform which serves the down Reading line. There is, however, a down line with its

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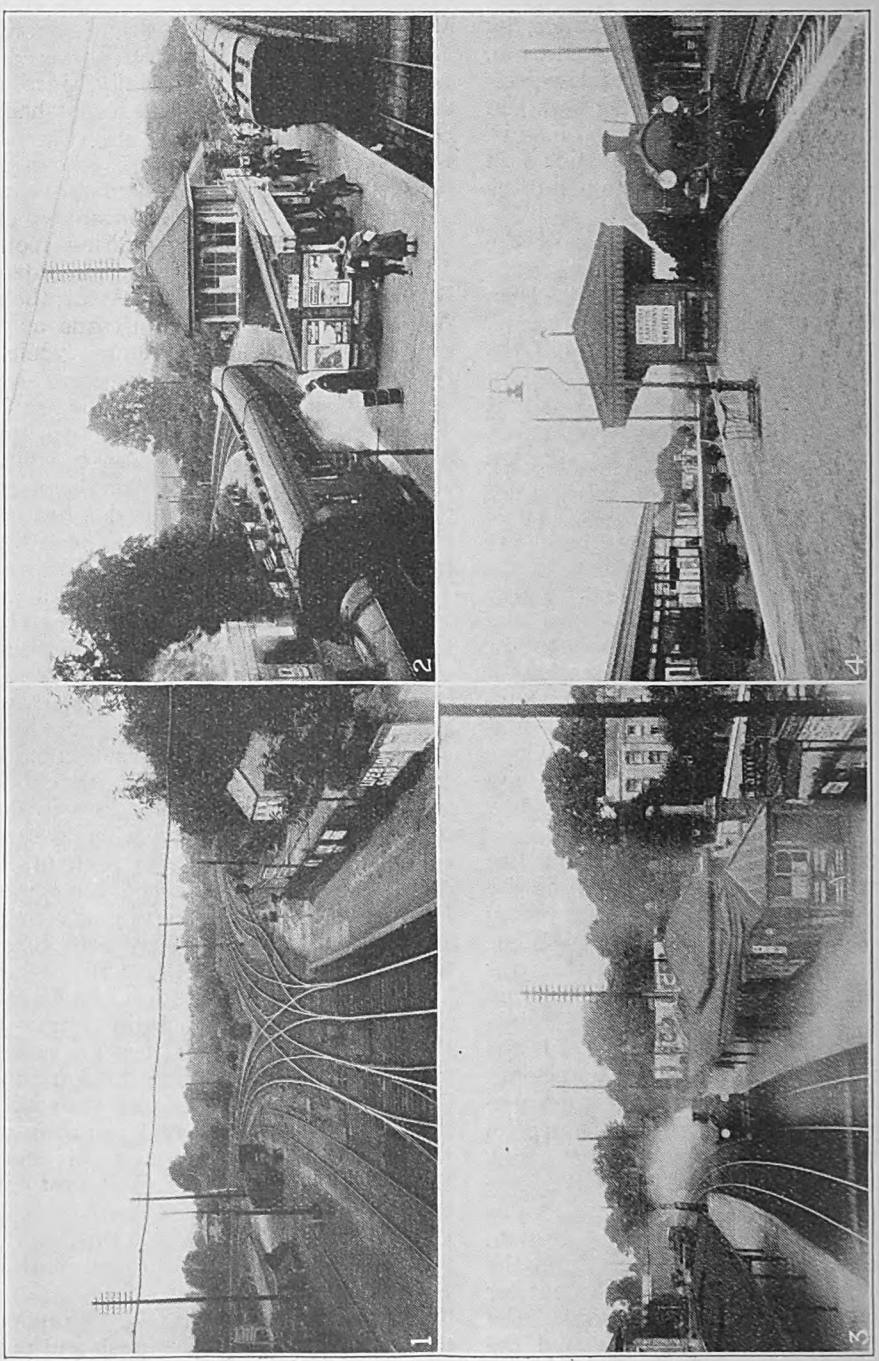

1. Staines Junction.
2. Virginia Water Station.
3. Staines Station.
4. Ascot Station.

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own platform beyond, used for trains which work through.

Beyond Ascot, Reading trains continue on the fringe of Bracknell Woods to serve Bracknell station before joining the South Eastern and Chatham line to Reading at Wokingham Junction. Bagshot trains curve away, through Bracknell Woods on the eastern side to Bagshot, and thence across Bagshot Heath to Camberley, the station for Sandhurst. The route is very pretty, sometimes with moorland, at others wooded, surroundings, and here and there a stretch of embankment or viaduct. Before reaching Camberley a short tunnel is passed through. Onwards the train passes through woods and fields to Frimley, with views of Chobham Ridge to the left. Before reaching Frimley the South Eastern and Chatham line to Reading becomes a near neighbour, though there is no adjacent station and but a passing glimpse is had once or twice thereof.

In view of the fact that it heralds the triple junctions beyond, the down starting signal at Frimley has associated with it triple distant signals. The actual junction occurs, however, some 67 chains further on. Turning eastwards, one route connects with the London & South Western main line by surface junctions towards London. The middle route proceeds towards Aldershot, passing under the main line, while to the right there is a curve and surface junction to the main line westwards. The South Eastern & Chatham line passes under the L. & S.W. main line a short distance further west.

The centre route follows the course of the Basingstoke Canal (this, by the way, is carried over the L.S.W. main line by an aqueduct) for some distance, and then crosses it before connecting with the direct line from Pirbright Junction used by trains between London and Aldershot and Farnham. Approaching Ash Vale station the canal is again crossed, while beyond the station the South Eastern and Chatham line from Reading is crossed. A little further on, near where the Reading line again crosses the Basingstoke Canal, a junction curve is laid in by which S.E. & C. section trains run between Ash and Aldershot stations. Approaching the latter extensive military sidings, barracks and other premises may be noted. A short tunnel is then traversed.

Aldershot Town station has an up platform and an island on the down side. The outer face of the latter is used by terminating trains, including the "push-and-pull" trains generally used for the shuttle service to and from Ash Junction.

Onwards to Farnham pretty country is traversed, and, in places, hop-fields. At Farnham Junction connection is made with the direct line from Guildford. Before reaching Farnham station the River Wey is crossed. The station has a terminal bay for starting trains on the down side, and, extending for some distance beyond, there is a siding on the down side giving access to a goods yard and works premises. A little further on sand pits are passed, these being used by the permanent way department.

Bentley is the junction for the Bordon Light Railway. Passenger traffic is generally worked by a "push-and-pull" train, for which a bay is provided on the down side, though frequently it works through to Farnham or Aldershot or beyond. The station lies between the River Wey and "Alice Holt Forest," while the branch skirts the fringe of the latter for about half of its length of 4½ miles. The branch is single line, controlled by electric train tablet, and checks and occasional stops are necessitated at some of the road crossings. The only intermediate station, Kingsley halt, is rather prettily situated and tree-shaded. Approaching Bordon the unfamiliar passenger is somewhat surprised to encounter a three-doll bracket signal, this being necessary in view of the fact that the branch train may use either of the two terminal platform lines in the public station, or, if a goods or military special, may go to the somewhat extensive sidings to the left for interchange with the military light railway from Bordon to Longmoor camp. This was a very busy section during the war, and most of our readers who served with the Railway Troops, as did the writer, will have recollections of both the Bordon and the Longmoor Light Railways.

Between Bentley and Alton, the extreme point considered in this article, there is a long and picturesque run of 4¾ miles, crossing the River Wey about half way. Alton station is somewhat peculiarly laid out. On the down side there is an island, the outer face of which is the down through line, the inner face being used for termin-

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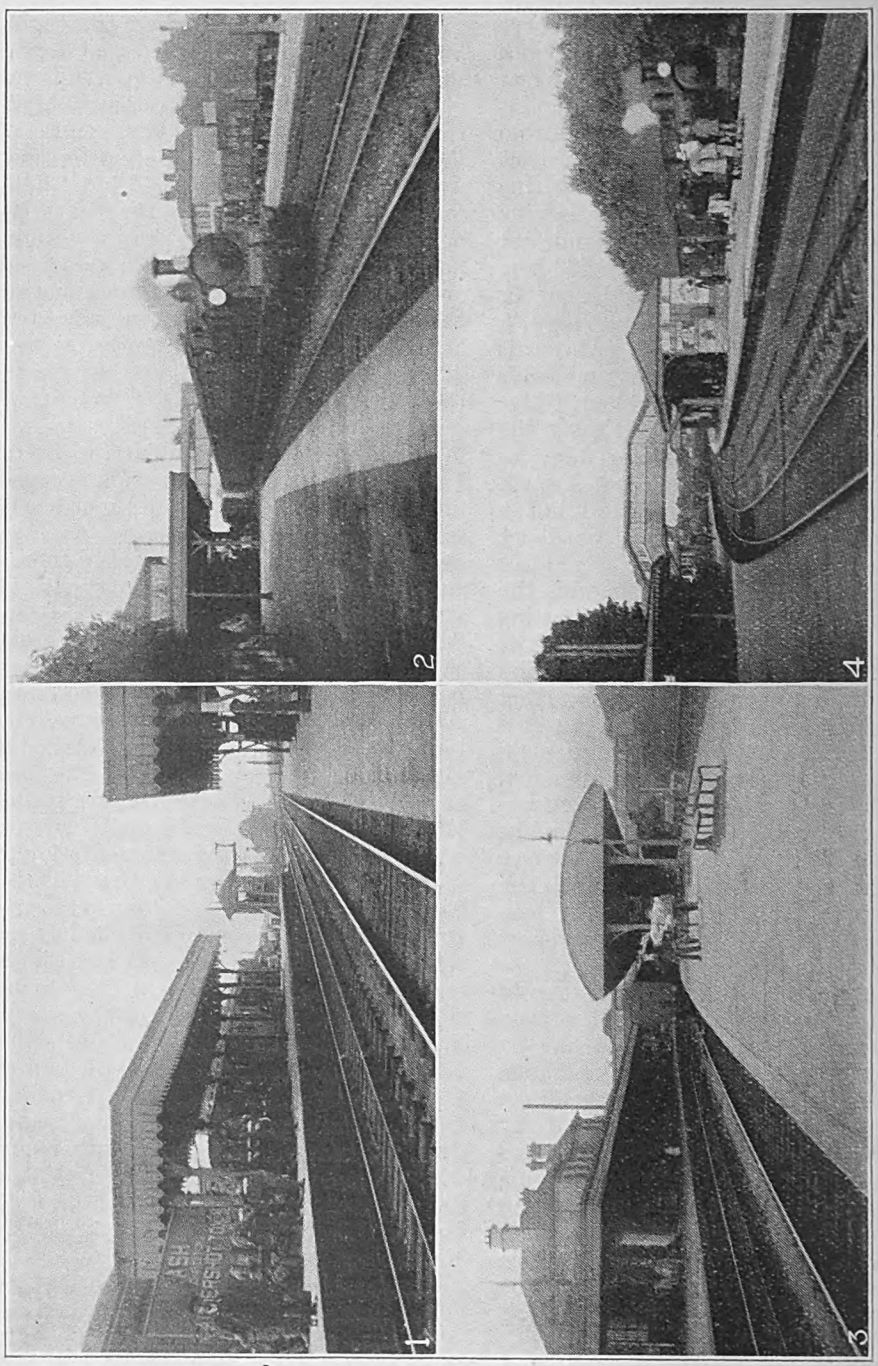

1. Ash Junction.
2. Farnham Station.
3. Aldershot Station.
4. Alton Station.

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ating trains or interchange purposes. Actually, this line constitutes a loop to the up line, which is outside and has its own platform, but connections enable it to be used also for down trains, besides allowing engines to run round their trains. The whole station is on a fairly sharp curve. At Butts Junction, about a mile beyond, the Basingstoke and Alton Light Railway diverges to the right, and the Meon Valley line to Fareham and Portsmouth to the left, while the centre route continues to join the main line at Winchester Junction.

A few notes may now be given as to other lines in the Aldershot and Guildford areas associated with those so far considered. Trains from Aldershot to London direct leave the route from Ascot, already described, just beyond Ash Vale. Thence an interesting stretch of moorland country is traversed, with the Fox Hills to the right, the gradients being far from easy. Shortly after passing through a tunnel, the up and down lines diverge, the up line passing over the main lines, while the down line proceeds direct to connect therewith at Pirbright Junction.

The route from Farnham Junction to Guildford does not call for much comment. Like all the other lines in this interesting area, it is picturesque or attractively pastoral, the station at Tongham and Ash Green being of usual type. At Ash Junction the S.E. & C. Reading route comes in, utilising the same metals to Guildford and thence south to Shalford Junction, where it diverges eastwards to continue its course to Dorking and Red Hill.

From Ash Junction northwards, S.E. & C. route trains soon reach Ash station, whence a shuttle train maintains the connections with Aldershot town, which gave the S.E. & C.R. a route to Aldershot in pre-grouping days. Bay lines are provided on each side to facilitate interchange of up or down passengers, as the case may be.

Before considering train services, it is necessary to add a few remarks in regard to the Weybridge-Virginia Water branch. On the up side there is, at Weybridge, a side platform with run-round road, for the branch trains, though at the hours of residential travel several trains work through to and from Waterloo. The branch is double track throughout. It soon makes connection with the completing lines of the Weybridge-Byfleet triangle, by which trains (principally goods) are able to run direct between the main and Virginia Water lines. This is a valuable connection, in view of the concentration of goods traffic upon Feltham. It communicates with the main line by a burrowing route on the down side.

Just beyond the junction the River Wey is crossed, and the line is generally picturesque. The two intermediate stations, Addlestone and Chertsey, are of usual type. The arrangement at Virginia Water has already been described.

Seeing that many of the routes described carry a considerable amount of residential traffic, even where distances of 30 or more miles are concerned, it follows that most of them require fairly generous train services. On the Windsor line the service is, generally speaking, hourly throughout the day, but half-hourly during the hours of business travel. As a rule, the trains serve all stations between Windsor and Twickenham, thence running fast to and from Waterloo, unless booked to call at Richmond.

The Reading line sometimes has two-hour intervals, but even the hour frequency is improved upon during the periods of business travel, particularly between Ascot and Waterloo. Some of the trains are also fast between Egham or Staines and Waterloo. Thus, the morning up service has, in addition to trains from Reading at 6.38, 7.30, 8.51 and 9.47 a.m., trains from Ascot at 7.41 and 8.53 a.m., the latter having a connection with a local from Wokingham. The latter train, which comes from Farnham via Frimley, is, moreover, non-stop from Egham to Waterloo, while several of the others call last at Staines or Ashford. Similarly, on Saturdays there are fast trains from Waterloo to Staines and stations to Ascot at 1.25 and 2.25, the 12.55 and 1.55 p.m. Waterloo to Reading trains being also fast. On other days the 2.55, 3.55, 4.55 (Egham first stop), 5.55 and 6.55 p.m. are fast to Staines, in each case following a Windsor train which picks up for them from Twickenham to Staines, while as far as Ascot there are fast trains at 5.25 and 6.25 p.m., also fast to Staines. These Ascot trains, by the way, actually work through to Woking or Aldershot via

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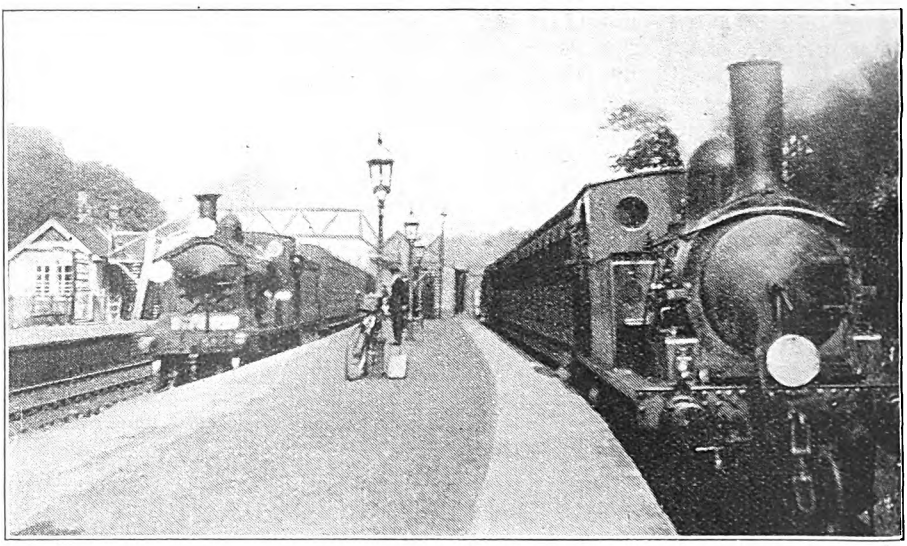
Frimley, thus giving the branch described through facilities at the hours of business travel. There are one or two other through trains, but, speaking generally, the Frimley route is otherwise served by "push-and-pull" or local trains, this applying also to those which work between Ascot and Aldershot or Farnham.

In the case of the Weybridge–Virginia Water line, there are through trains to and from Waterloo at business periods and locals at other times and to amplify facilities. A number, however, particularly the through business trains, start from or terminate at Chertsey, as Virginia Water has complete facilities on its own account via Richmond.

On the Aldershot and Farnham line the service is made up from through trains between Waterloo and Eastleigh (or beyond), via Alton and Winchester, Fareham and Gosport or Portsmouth via Alton and the Meon Valley line, with a few locals due to continuation journeys by the Bordon branch train or by trains to and from Guildford via Ash Green. In the aggregate, quite a frequent service is provided in the Aldershot district, including several express facilities. Thus, Aldershot has non-stop trains to Waterloo at 9.38 a.m. and 5.59 p.m., with another at 11.6 a.m., calling at Brookwood only, while the 9.10 a.m. and 4.20 p.m. down trains call at Woking only, and the 6.38 p.m. at Woking and Ash Vale only.

In this connection a brief record may be given of an up run from Aldershot to Waterloo on the 5.59 p.m. train, worked by a "Drummond" 0-4-4 tank engine, No. 24, with a load of 10 ordinary bogies. Leaving Aldershot at 6.4 p.m., Ash Vale was passed at about 45 m.p.h. Thence across the moorland stretch to Pirbright Junction includes some hard pulling, but Brookwood, where speed was reduced to transfer from slow to fast lines was passed in 10.7 minutes (7·3 miles). Exactly five minutes later, Woking was passed at about 55 m.p.h., this speed being maintained, with a touch of 60 m.p.h. at Esher, to Raynes Park, passed in 17·7 minutes (15·8 miles). Thence to Clapham Junction speed was kept under to avoid running into adverse signals, and eventually we came to a stand beyond Vauxhall, practically at the time booked for arrival in Waterloo. As the start was five minutes late, this meant that running time had been kept.



ALTON AND BORDON TRAINS AT BENTLEY.

Most of the incidental and local routes have a fairly frequent train service, much better than many lines elsewhere of a similar character. Thus, the Bordon branch has 12 or 13 trains each way daily, and there are 11 between Farnham and Guildford via Ash Green, besides two or three between Farnham and Ash Junction connecting with S.E. and C. section trains on the Charing Cross Reading route via Guildford.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

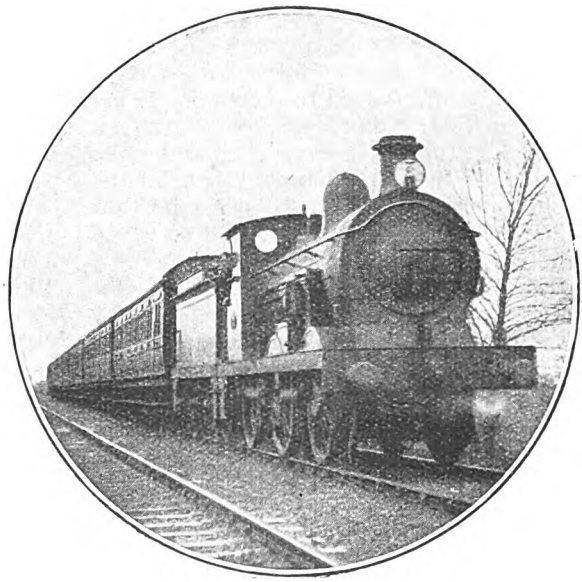

Photo.] [*R. D. Lund.*

0-6-0 NO. 36A ON KNOCKHOLT BANK, EASTERN SECTION, S.R.

So much correspondence has reached me relative to my last three articles, that it is difficult to find adequate space in which to make it public. Pride of place shall be given to a letter from Lord Monkswell, who discusses my comments in the May issue on his previous letter concerning the recent G.W.—L.M.S. locomotive exchange. "With regard to the points that you raise," he says, "I think I may say that they had all occurred to me when I wrote to you. But there are so many things to say on such a subject, and anything like an absolutely water-tight statement requires so much space, that I did not go into them. In the matter of coal consumption I did not attempt to make any comparison. I had no figures as to the coal consumption of the Great Western engine, and so could not do so. I must say, however, that to me performance is the first consideration, and coal consumption appears to me to be relatively unimportant. I thought I had made it plain that the comparison I made was solely one of power, and was based upon the work of the Great Western engine up Shap and of the Nord engine up Caffiers; if this was not clear previously, I trust that this explanation will put the matter beyond doubt." At this point I would interject the comment that, as I stressed last month, coal consumption—*plus*, of course, the observance of schedule time, in which *Launceston Castle* much more than succeeded—was the *ruling* consideration in the recent exchange, and this being so, I repeat my claim as to the doubtful value of Lord Monkswell's particular comparison, in which the Nord engine was, on his admission, doing her very utmost, on a schedule of abnormal difficulty, with fuel consumption as a secondary, and not the primary consideration.

"But though performance seems to me to be the crucial matter," Lord Monkswell continues, "I have no reason to suppose that the Nord engine was in any way behindhand in economy. The only definite figure I know is the official average of 54 lb. per mile for the latest 4-6-2 engines working the Rapides between Paris and Calais, with 500 metric tonnes behind the tender. This presumably refers to the trains running from Paris to Calais in 3¼ hours, and to the return trains, which have a schedule 10 min. slower. A recent experience of mine was in conformity with this estimate, though I had no means of directly measuring the coal consumption. With 540 metric tonnes behind the tender, one of the big 4-6-2's made up at least 10 minutes on one of the 3¼-hour bookings.

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and used 32 cubic metres of water on the journey. As she was fitted with a feed-water heater, claimed to economise 15 per cent. in fuel, it is reasonable to suppose that 6 lb. of water were evaporated per pound of fuel. This would give a fuel consumption of 60·65 lb. per mile, but the work was far superior to that on which the 54 lb. per mile estimate is based. I should be much surprised if the Great Western engine could do as well on the basis of work done in proportion to fuel burned." My own impression was that the 54 lb. per mile coal consumption of the French Nord "Pacifics" covered both the

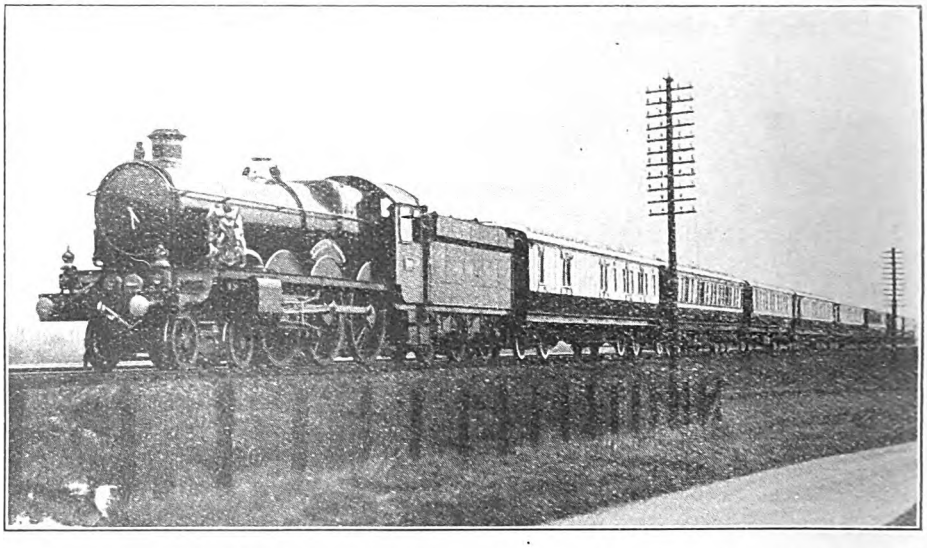

Photo.] ROYAL TRAIN, PADDINGTON TO CARDIFF, G.W.R. [*M. W. Earley.*

Four-cylinder 4-6-0 locomotive No. 5000, *Launceston Castle*.

Boulogne and Calais boat trains, the "Golden Arrow" excepted, a number of which fall considerably short of 500 tons in weight; I rather think that Lord Monkswell's figures confirm my view, as an increase in load from 500 to 540 tons, and 10 minutes' gain in time, ought not to increase coal consumption by 6 to 11 lb. per mile—that is, by 11 to 20 per cent.

"With regard to cut-off," Lord Monkswell continues, "I must point out that the Nord engine, when cutting off in the high-pressure cylinders at 70 per cent. at Caffiers summit, was passing only about as much steam as a Great Western 'Castle' passes when cutting off at 45 per cent. at the same speed; and when we remember that the Great Western engine was developing only two-thirds of the horse-power developed by the Nord engine, a cut-off of 30 per cent. would give the power required, if the steam were used to equal advantage." From my experience of Driver Young and *Pendennis Castle*, when travelling to Plymouth on the "Limited," I should imagine that 30 per cent. cut-off, or at most 35 per cent., with full regulator, was just about the handling to which *Launceston Castle* was responding in the particular climb up Shap on which Lord Monkswell has based his comparison.

"I did not fail to consider the performance of the Great Western engine between Bletchley and Tring," Lord Monkswell proceeds, "but I chose the climb up Shap for two reasons: first, because it appeared to me to call for the development of more power; and secondly, because it is desirable that, in calculating locomotive horse-power, as large a proportion as possible of the resistance shall be that due to the exactly measurable resistance of gravity. Actually, on calculation, the performance from Bletchley up to Tring does not show up any better in comparison with the running of the same Nord engine and train over a somewhat

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comparable length of line, than does the performance of the Great Western engine up Shap compare with the Nord engine's work up Caffiers. From Bletchley there are, first of all, nine miles rising at about 1 in 333. Compare this with the length from post 120, at the foot of the Gannes bank, to post 94, nearly the same distance; of the latter, the first 10 miles rise on an average at about 1 in 300, and the remaining six at about 1 in 550. Between Bletchley and Tring, therefore, the vertical rise is about 145 ft., and up the corresponding length of line on the Nord about 230 ft., or half as much again. With 581 tonnes post 27, near Survilliers Summit, in exactly 18 min. from Paris, at a speed of no less than 61 m.p.h., which involved an effort considerably greater than those witnessed by me." This may have been so as regards the whole of the journey between Calais and Paris, but as, in Lord Monkswell's original comparison, the 4-6-2 engine was ascending Caffiers with full regulator and full cut-off in both high and low-pressure cylinders, it is obvious that the maximum possible was being done on that particular climb. Not for one single moment, however, do I attempt to disparage or belittle these marvellous achieve-

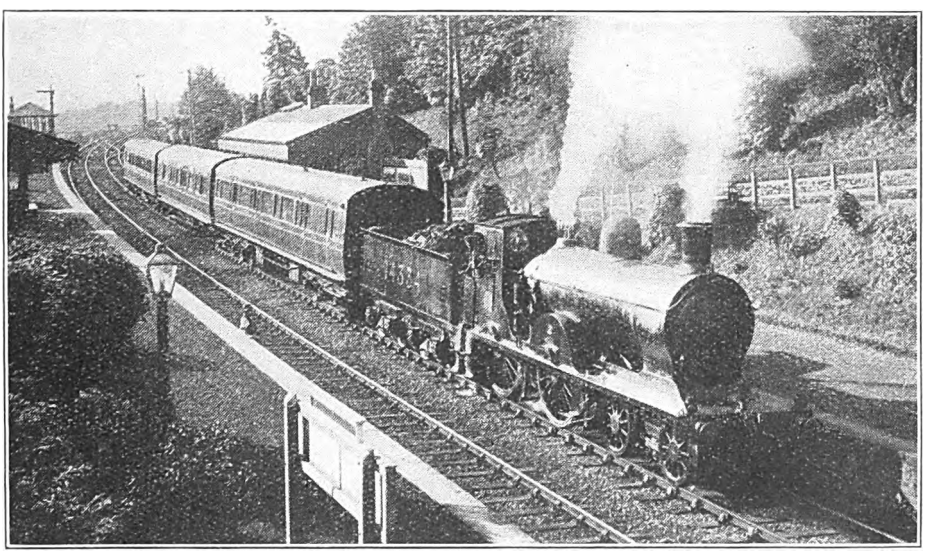

Photo.] [*C. J. L. Romanes.*

MOFFAT-EDINBURGH TRAIN IN CRAWFORD STATION, L.M.S.R

Caledonian Section 4-4-0 No. 14334.

behind the tender I have timed a Nord 4-6-2 engine to run the 26 km. in exactly 16 min., at an average speed of 60½ m.p.h.; speed fell from 63 m.p.h. at the foot of the bank to 58 m.p.h. at post 94, where we were slacked. The Great Western engine, with 505 tons, ran 15 miles in 15 min. 10 sec., averaging 59¼ m.p.h., and speed fell from 68 m.p.h. to 52½ m.p.h.

"Finally, you point out that the Great Western engine was not doing her best. Neither was the Nord engine. I have just learned that one of the Nord super-4-6-2's, with 540 metric tonnes (531 English tons) behind the tender, lately passed

ments of the four-cylinder compound Nord "Pacifics." More than once, in these columns, I have contended that no locomotive work in these islands, even in proportion to the size and power of the engines concerned, can rise to the maximum level of what is done on the Nord. But I still adhere to my original contention that Lord Monkswell was not happy in his choice of two runs on which both to base a comparison and also to draw, as he did, a very sweeping conclusion. And there I must leave it.

Many interesting letters have reached me concerning the discussion on the

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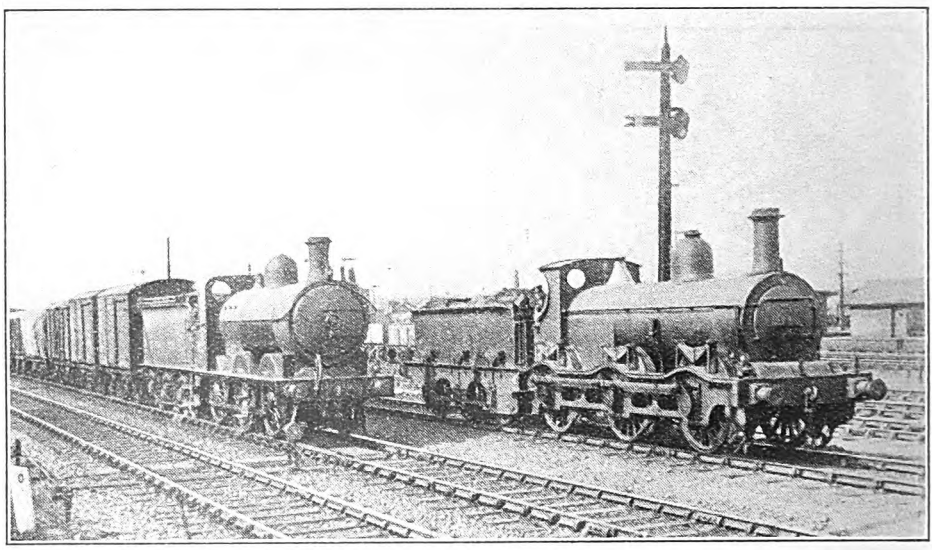
relation between piston stroke and driving-wheel diameter which figured in my April article. One correspondent, well informed on Southern affairs, writes to the effect that experiments have recently been made over the boat-train routes of the Eastern Division with 4-6-0 No. 478E, of the intermediate "Urie" class, with 6-ft. wheels. This engine has been used for a period in competition with the larger-wheeled "King Arthurs," and in consequence of the data obtained, it appears likely that the forthcoming batch of "Lord Nelsons," which are intended primarily for these boat-train workings, may be fitted with 6-ft. 3-in. driving wheels. The more frequent use of the Maidstone route, with its very heavy gradients and its service slacks, has doubtless, as my friend observes, some bearing on this decision.



Photo]. [*Henry L. Salmon.*

M. AND G.N. JOINT RAILWAY 0-6-0 LOCOMOTIVE NO. 82, AND OLD L.M.S. (MIDLAND) 0-6-0 LOCOMOTIVE NO. 2789 AT PETERBOROUGH.

And now for a Crewe letter. In adverting to Mr. Hunt's original argument, the Crewe writer remarks: "Your correspondent seems to concentrate on cylinder volume only. I am thoroughly in agreement with the long-stroke policy, but what your correspondent appears to overlook is the fact that all these engines with moderate cylinder diameters and long strokes have high boiler pressures. What is more important is the fact that they all have extremely good arrangements for getting rid of their exhaust. Surely these are the secrets of the successful performance of the Great Western 'Castles' in the exchange trials of 1925 and 1926, as well as of the Southern *Lord Nelson*, in his recent exploits. Again, your correspondent appears to object to the extra revolutions required by moderate wheel diameters, but why? They must, after the fashion of a flywheel, result in a better tendency to 'keep going,' as well as affording a quicker succession of blast 'beats,' to the benefit of the fire; and to this may be added the extra leverage of the longer stroke. I am talking more particularly here of two-cylinder engines." These are undoubtedly material advantages, but at the same time it must not be forgotten that reduced wheel diameters mean increased piston speed, with a proportionate increase in the speed of the motion parts of the engine; lengthened stroke adds still further to these speeds. In the case of engines intended for continuous high speeds, such considerations must not be entirely overlooked, despite the remarkable feats of speed constantly performed by, say, the 6-ft. 3-in. Nord 4-6-2 engines, the 6-ft. 3-in. L.M.S. "Prince of Wales" 4-6-0's, the 6-ft. Southern 2-6-4

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tanks, and the 5-ft. 8-in. L.N.E. and Great Western "Moguls," to name only a few examples.

"With regard to the Great Western 2-6-0's," my friend continues, "the point is that they *can* attain high speeds, and as for clanking, it is mild indeed as compared with that of the Gresley 2-6-0's of the L.N.E.R. at any speed. Your correspondent remarks: 'If their (the G.W.) cylinders were of the same dimensions as those . . . of the L.N.E.R. 2-6-0's, one wonders if they might not work quite as efficiently as at present.' To which I would reply: 'If the valve events of the boilered 'L' class engines of the Eastern Division."

From Northamptonshire another correspondent writes on much the same lines. "The Urie 6-ft. 4-6-0 engines," he says, "were primarily intended for 'mixed traffic' service. With its moderate proportion of freight to passenger traffic, compared with the corresponding figures of the other three groups, the Southern finds it more economical to employ locomotives which can work fast goods trains, or semi-fast or even fast passenger trains when necessary, rather than to build engines with such small wheels as to make them

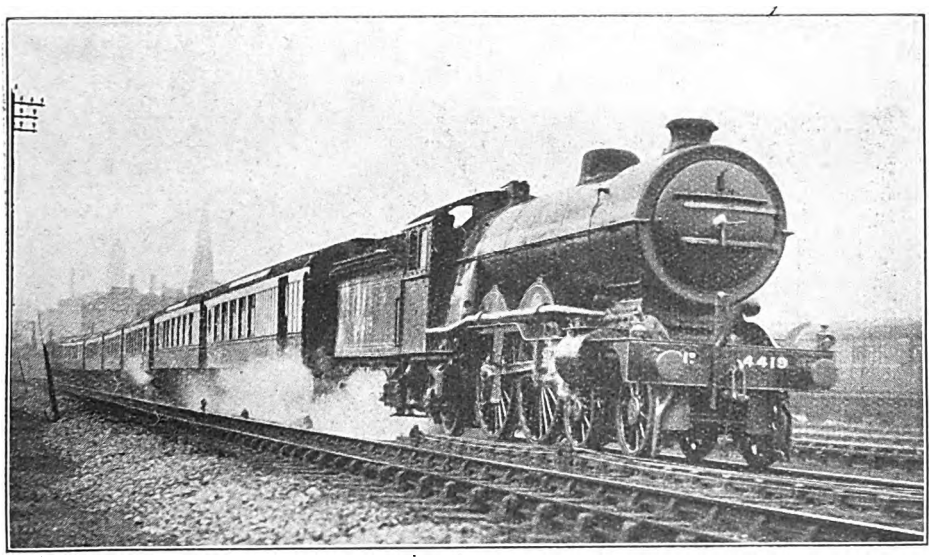

Photo.] [*F. R. Hebron.*

DOWN "HARROGATE AND EDINBURGH PULLMAN."

G.N. Booster-fitted 4-4-2 No. 4419. Booster engine in operation on Holloway bank.

L.N.E.R. engines were the same as those of the G.W. 2-6-0's, with their longer stroke, would the former work as efficiently as the latter?' I venture to think not. Your correspondent than makes statements about Mr. Maunsell having cut down the diameter of the Urie 4-6-0 express engines from 22 in. to 20½ in. in the 'King Arthurs,' but he seems to overlook the fact that the pressure has been raised at the same time from 175 to 200 lb. per square inch. The tractive effort is thus practically unaltered; and the same may be said of the latest Maunsell 4-4-0's, in comparison with the previous large-suitable for goods traffic alone. These 'mixed traffic' types have always been a feature of London and South Western practice, as witness the Adams 0-4-2's and the early Drummond small-wheeled 4-4-0's. Now I take it that the leverage obtained with a 28-in. stroke is of great value when a heavy load has to be taken over average Southern gradients, and especially those of the West of England main line. It seems probable, therefore, that the reason why Mr. Urie made his intermediate 4-6-0 engines with 6-ft. wheels and 28-in. stroke, was to give them power enough for freight train working, and wheels

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just large enough for express passenger traffic.

"With the Maunsell 2-6-4 tanks, it is a different matter. As far as I can judge from your articles, speeds on the Brighton section of the Southern do not usually rule very high, and the 75-m.p.h. quoted by Mr. Hunt may be regarded as the maximum. The traffic is so dense on this section that high speeds are not desirable, owing to the shortness of the block sections, and the difficulty of pulling up quickly in the event of signal checks."

"What is wanted, therefore, is the ability to accelerate quickly from a signal check, even if it be on rising gradients. Now Mr. L. B. Billinton sought to obtain this capacity by the use of 22 in. by 28 in. cylinders on his 4-6-4 tanks. But he connected these cylinders to wheels of 6 ft. 9 in. diameter, which is surely surprising, because I take it that the larger wheel gives a slower acceleration. Mr. Maunsell, on the other hand, is able to economise in cylinder volume by providing smaller wheels. But at the same time he raises his working pressure from 180 to 200 lb., and also increases the travel of his valves, with the result that the 2-6-4 tanks can get their steam away at any speed, and are regarded by their drivers, singularly enough, as considerably faster engines than the 'Baltic' tanks, despite the 9-in. larger driving wheels of the latter."

My correspondent then deals at some length with the apparent anomaly of the newest "L" class 4-4-0 engines of the Eastern Division, possessing cylinders 19½ in. by 26 in. only, and, on the other hand, *Lord Nelson*, with four 16½ in. by 26 in. cylinders, both from the designs of the same engineer, and both types, though at opposite poles in the relation of cylinder dimensions to capacity for producing steam, capable of astonishing work, as these columns have witnessed already. "Is chance or science the controlling factor in these things," my friend concludes, "and if the latter, can you, with your unrivalled opportunities for forming a conclusive judgment, tell me what are the ingredients necessary to produce a successful locomotive on any given railway?" To be perfectly frank, I cannot. In designing any locomotive, due attention must, of course, be paid to certain essential ratios between leading dimensions, but variation of these ratios, even within wide range—as we have

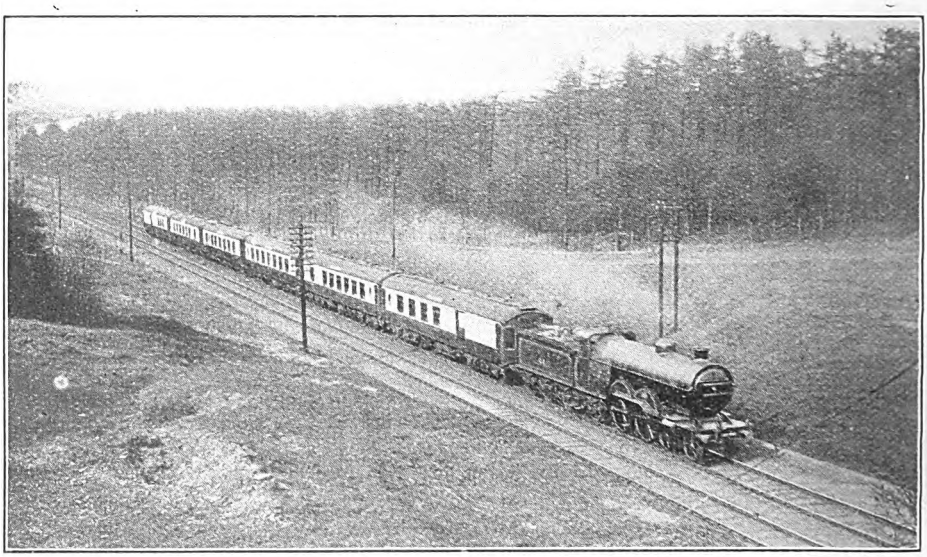

Photo.] [*H. Gordon Tidey.*

UP "EDINBURGH AND HARROGATE PULLMAN."

4-4-2 locomotive No. 4411.

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already seen—appears to have but little measurable effect on performance.

Locomotive performance is, indeed, compound of so vast a diversity of factors that it is practically impossible to lay down definitely, in advance of completion, whether any locomotive design is going to work out to full satisfaction. Many of the most famous locomotive classes in the country differ in some material respect from the drawings to which the first examples of the respective types were built; this applies, for example, to the Great Western "Castles," the Midland compounds of the L.M.S., *Lord Nelson* of the Southern, and many others.

In some cases no amount of subsequent alteration has availed to overcome errors in the initial designs, and the engines so designed have never, in consequence, done the work that might be expected of them, in proportion to their size and nominal power, save perhaps for streaks of occasional brilliance, in the hands of crews of exceptional ability. But it seems to me that, in any case, while expert designing does—and, indeed, must—play the largest part in successive locomotive design, yet there must be, at the same time, not a little "trial and error" before success is finally achieved.

For my "performance" this month, I have first a couple of up runs on the "West Riding Pullman" of the L.N.E.R., of the more particular interest in that they offer a comparison between the work of one of the Great Central four-cylinder 4-6-0 engines and a Great Northern "Atlantic," and also because on both occasions an unusually weighty train of eight vehicles was taken. Strictly speaking, both the trains concerned were those working on the Harrogate service, though travelling via Leeds. The first run of the two was made in the early days of this service, when the "Harrogate Pullman" ran daily via Leeds; the second was in the period following the coal dispute, when the "Harrogate and Edinburgh Pullman" was also running via Leeds, and adding at Wakefield the two Halifax Pullmans to its normal six-coach Pullman formation. Explanation of the considerable disparity in total weight between the two trains is afforded by the fact that on the first occasion there were only three 12-wheeled Pullmans in the formation, together with three eight-wheeled Pullmans and two Great Northern

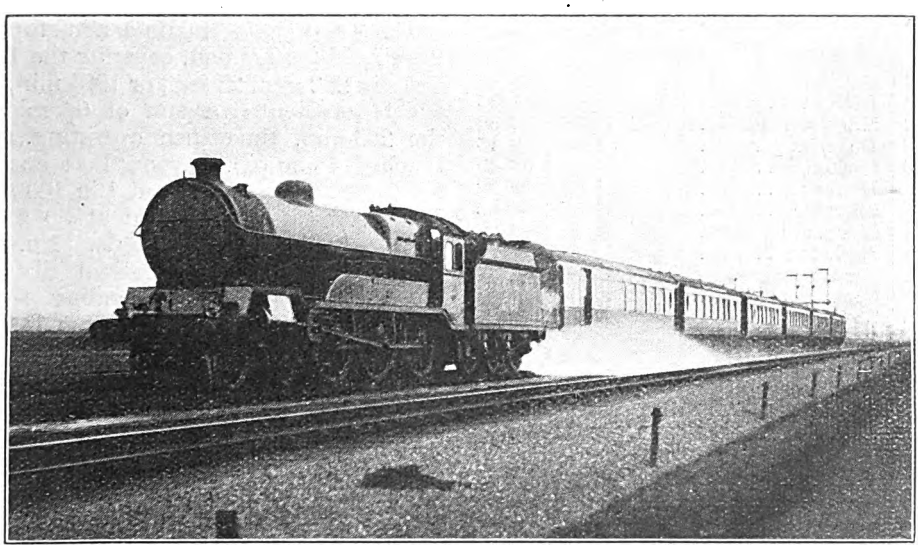

Photo.] [*Henry L. Salmon.*

DOWN "HARROGATE AND EDINBURGH PULLMAN."

G.C. Four-cylinder 4-6-0 No. 6168 picking up water at Werrington troughs.

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L.N.E.R. UP "WEST RIDING PULLMAN."

Distance.		Schedule.	6165 *4-6-0	4458 †4-4-2
	Engine No.		6165	4458
	,, Type		*4-6-0	†4-4-2
	Load (vehicles)		8	8
	,, (axles)		38	44
	,, (tons, tare)		291	336
	,, (tons, full)		300	345
Miles.		Min.	m. s.	m. s.
0·0	Wakefield	0	§ 0 00	‡ 0 00
1·7	Sandal	—	2 35	3 30
4·0	Hare Park	—	5 45	6 45
5·5	Nostell	—	8 00	9 00
8·0	Hemsworth	—	11 00	11 55
13·3	Hampole	—	15 45	16 40
17·1	Castle Hills	—	19 00	19 50
19·9	Doncaster¶	23	22 30	23 15
24·6	Rossington	—	28 10	29 00
26·4	Piper's Wood	—	30 20	31 15
28·2	Bawtry	—	32 10 sigs.	33 05
32·0	Ranskill	—	36 20	36 30
37·3	Retford	41	43 00	41 35
42·2	Markham Box	—	48 55	46 50
44·6	Dukeries Jc.	—	51 30	49 15
49·5	Carlton	—	55 35	53 40
55·8	Newark	60	61 00	59 30
60·5	Claypole	—	65 35	64 25
64·4	Hougham	—	69 15	68 20
66·2	Barkston	—	71 15	70 25
70·4	Grantham	76	76 20	75 25
73·9	Great Ponton	—	80 20	79 05
75·8	Stoke Box	—	82 35	81 25
78·8	Corby	—	85 30	84 25
83·7	Little Bytham	—	89 20	88 30
87·3	Essendine	—	91 55	91 20
91·1	Tallington	—	94 50	94 30
96·4	Werrington Jc.	—	99 05	99 15
99·5	Peterborough¶	106	103 10	103 05
103·3	Yaxley	—	108 25	108 30
106·5	Holme	—	111 25	111 35
112·4	Abbot's Ripton	—	117 20	117 25
113·9	Leys Box	—	119 15	119 15
117·0	Huntingdon	125	122 15 sigs.	122 15
124·2	St. Neot's	—	130 10	129 15
131·8	Sandy	—	137 55	136 45
138·9	Arlesey	—	145 30	144 10
144·0	Hitchin	152	151 25	150 00
147·3	Stevenage	—	155 50	154 30
150·9	Knebworth	—	159 55	158 30
153·9	Welwyn	—	163 15	161 40
158·2	Hatfield	167	167 05	165 25
163·2	Potter's Bar	—	172 10	170 25
166·7	New Barnet	—	175 35	173 55 p.w.s.
170·9	Wood Green	—	179 10	178 30
173·3	Finsbury Park	—	181 45	181 15 sigs.
175·9	King's Cross	187	186 00	186 00
175·9	Net times (min.)	187	‖ 182¾	184¼

* G.C. 4-cylinder 4-6-0 *Valour*.
† G.N. 2-cylinder type. ‡ Starting time.
§ *Passing* time. ¶ Service slack.
‖ Equivalent net time from start to stop.

24-ton bogie brake vans, whereas No. 4458 was faced with the problem of hauling six 12-wheelers and three eight-wheelers, all of Pullman stock. The singular fact that will be noted from the table of times that the "Atlantic," with the heavier train, made better times up several of the banks, whereas the 4-6-0 was decidedly the faster downhill. But the honours undoubtedly rest with No. 4458, and her able driver, Sparshott, who succeeded in observing, despite nearly 2 min. loss by checks, the Wakefield to King's Cross time of the old 2 p.m. from Leeds, with a load nearly twice the maximum usually carried by that famous "flier."

The 4-6-0 engine made a non-stop run from Leeds to London, covering the 185·8 miles in 202 min. 25 sec., or 198¼ min. net, which represented a gain of 6¾ min. on the 205-min. time then operating. We touched 45 m.p.h. beyond Beeston, and fell to 30½ on the 3 miles at 1 in 100 up to Ardsley, passing Wakefield at 30 m.p.h. in 16 min. 55 sec. from Leeds. No. 4458 took 20 min. 10 sec. for the same distance, start-to-stop, the corresponding speeds being 41½ and 28 m.p.h. At Sandal, No. 6165 attained 49 m.p.h., and No. 4458, after a fine acceleration from rest, 47½ m.p.h., and the minimum rates up 4 miles chiefly at 1 in 150 to Nostell were 40 and 39 m.p.h. On the subsequent descent past South Elmsall and Adwick, the highest speeds were 74 and 72½ m.p.h., but the "Atlantic" speed was the better maintained of the two. After the Doncaster slowing, to 30 m.p.h. on both runs, we touched 55½ and 55 m.p.h. at Black Carr, fell to 50 and 50½ at Piper's Wood, attained 67 and 69 at Scrooby troughs, after which the 4-6-0 suffered a bad signal check at Ranskill, the effects of which were felt on to Markham. The "Atlantic," however, breasted Markham Summit at a minimum of 51 m.p.h.—a good figure up 3¼ miles at 1 in 178-200.

Down to Carlton, the maximum speeds were 77½ and 72½ m.p.h., while after crossing the Trent Valley, the 4-6-0 was still doing 68 at Newark and 60 at Claypole, whereas the 4-4-2 had fallen to 61½ and 58½ m.p.h., respectively. At Peascliffe Tunnel, the minima on the 1 in 200 were 49 and 51 m.p.h., but the "Atlantic" then made a remarkable recovery on the short

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level to Grantham, passing that station at the unusual speed—for the up direction of running—of 61 m.p.h. The 4-6-0 went through at 57½, and breasted the 5¼ miles at 1 in 200 to Stoke at a minimum of 53½ m.p.h., whereas the 4-4-2 fell to 49 an hour by a more rapid deceleration, particularly through the tunnel. Down the long descent past Essendine *Valour* had all the best of it, touching 85 m.p.h. below Little Bytham and averaging 77·7 m.p.h. over the 17·6 miles from Corby to Werrington; No. 4458 did not exceed 76½ m.p.h. It should, however, be noted that the "Atlantic" had succeeded in maintaining, 74 through Hatfield. The "Atlantic" passed St. Neot's at 55½ m.p.h., Tempsford at 66, Langford at 52½, Three Counties at 59, Stevenage at 46½, Langley at 60, Knebworth at 55, Hatfield at 76½, Potter's Bar at 55½, and New Southgate at 71½, after which followed checks. The 4-6-0 covered the 165·3 miles from Hemsworth to Finsbury Park in 170¾ min., or in 166½ min. net, if allowance be made for the two signal checks, but inclusive of the two severe slowings through Doncaster and Peterborough. The "Atlantic" ran the same distance in 169 min. 20 sec., or 168 min. net, but in view of the fact that

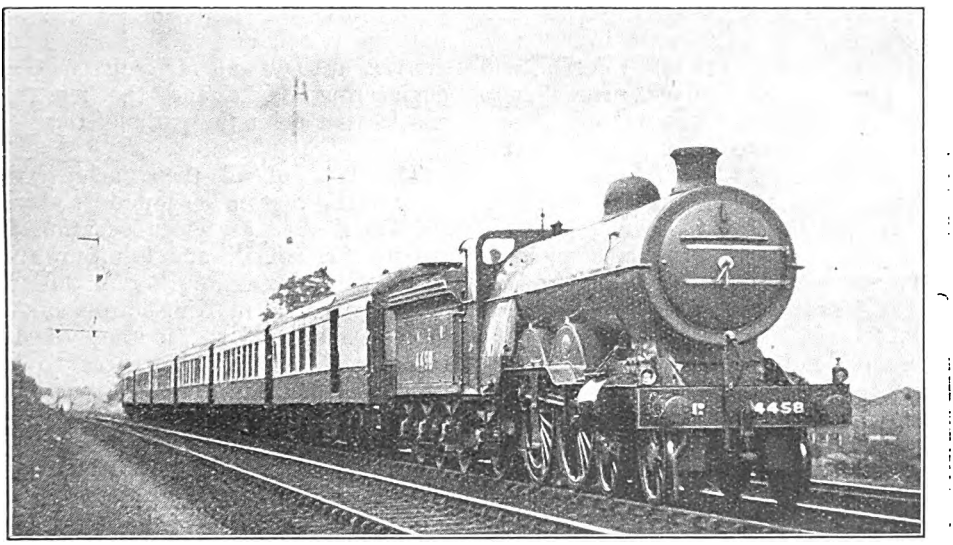

Photo.] [*W. Leslie Good.*

UP "HARROGATE AND EDINBURGH PULLMAN" NEAR GRANTHAM.

G.N. 4-4-2 locomotive No. 4458.

with 345 tons, an average speed of exactly 60 m.p.h. from Doncaster to Peterborough, thereby economising 3 min. on schedule time, despite the extra load; the net time of the bigger 4-6-0, with 45 tons less, was about 77¾ min. for the 79·6 miles.

At Holme, the 4-6-0 and the 4-4-2 were doing 68 and 66 m.p.h. respectively, and the minima up Abbot's Ripton bank were 48 and 50½ m.p.h. Then, after maxima of 66 and 67 m.p.h. through Huntingdon, the 4-6-0 suffered a signal check at St. Neot's, and being before time, her driver did little else of particular note, the chief variations of speed being 47 m.p.h. at Stevenage and Sparshott had an engine lighter by 10 tons, and a train heavier by 45 tons, his was clearly the more creditable achievement of the two, though both were fine runs.

In the down direction I have had, recently, a good run on the 11.20 a.m. down "Harrogate and Edinburgh Pullman," which did not incorporate many features, however, worthy of a tabular statement of times and speeds. "Atlantic" No. 4404 was the engine, and the load six 12-wheeled and one 8-wheeled Pullmans', or 256 tons empty and 265 tons full. Of this train our engine made light, passing Finsbury Park in 6½ min., Potter's

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Bar in 20 min. 5 sec., at 42½ m.p.h., Hatfield in 25 min. 10 sec., at 72½ m.p.h., Hitchin in 38 min., 50 sec., Arlesey in 43 mins., at 76½ m.p.h., Sandy in 49 min. 20 sec., and Huntingdon in 62 min. 20 sec. Between Tempsford and Peterborough was witnessed the only flash of brilliance of the journey, the minimum at St. Neot's being 66 m.p.h., the maximum at Offord 75, the minimum at Leys Box 57, and the maximum at Holme 80½, so that we were through Peterborough in 78 min. 35 sec. We did quite well on to Grantham, too, with speeds of 64 m.p.h. at Tallington, and a minimum of 45 at Stoke, so getting through Grantham in 111 min. 5 sec. After that the very easiest of running sufficed us to breast Newark in 124 min. 35 sec., Retford in 143 min. 55 sec., and Doncaster in 162 min. 10 sec., nearly 3 min. early. We had run the 143·3 miles from Hatfield to Doncaster, including Peterborough slack, in 142 min. 5 sec.

Shortly after passing on to the L.M.S. line at Shaftholme Junction, we were pulled up by signal at a box rejoicing in the name of "Cridling Stubbs," just short of Knottingley, where we stood for 2 min. 25 sec., thereby losing fully 5 min. in running, and at a stage of the journey when it would have been difficult to recoup all the loss. To the credit of the driver be it said, however, that we reached Harrogate only a minute late. This is a most difficult piece of road; we slacked to 30 m.p.h. over Shaftholme Junction, 25 through Knottingley, 35 at Burton Salmon, 25 at Church Fenton, and 30 through Tadcaster; between these slowings, by rapid accelerations, we worked up to 50 m.p.h. at Norton, 56½ on the level before Burton Salmon, 65 on the level at Sherburn-in-Elmet, 60 on mainly rising grades before Tadcaster, and 66 on the short 1 in 116 beyond Wetherby West Junction, after which we eased to 50 over the curves near Spofforth. Minimum up the 1 in 86 (3 miles) to Crimple Tunnel was 33 m.p.h., and up the further 2 miles at 1 in 122-91 before Harrogate 26 an hour. So the 4·2 miles from Doncaster to Shaftholme took 5 min., the 10·5 miles thence to Knottingley (including the stop) 20¼ min., the 3·1 miles from Knottingley to Burton Salmon 4¾ min., the 5·9 miles on to Church Fenton 6¾ min., the 4·7 miles from there to Tadcaster 6½ min., the 9·4 miles from Tadcaster to Spofforth 9¾ min., and the last 5 miles into Harrogate 7 min. 55 sec. Net time over the 198·8 miles from King's Cross to Harrogate was therefore 219 min., or 4 min. under schedule, and there is no doubt that, had the signal delay occurred earlier in the journey, the odd minute late in actual arrival time would have been more than regained.

As will have been evident to those who have noted various paragraphs in the Press, as well as the railway journals, on the subject, much consistent regaining of time goes on with these Pullman trains on the L.N.E.R. The link of drivers to whom their working is entrusted is small, but enterprising and enthusiastic, and late arrivals are few and far between, despite engineering slacks and the few signal checks that beset the paths of the "Pullmans."

The best of all these achievements, early in the year, never found its way into the limelight; it was an occasion when the up "Harrogate and Edinburgh Pullman" left Harrogate 12 min. late, and actually arrived in King's Cross on time, having completed the journey of 198·8 miles, with all the hindrances to speed incidental to the opening 40 miles of the course, in the record time of 208 min. Of the gain in time, 10 min. were regained south of Doncaster, so that the 156 miles from there to town were completed in 155 min. The engine was an "Atlantic," and the load the usual one of six Pullmans. I wish it had been possible to reproduce the detailed figures of the running on this noteworthy trip. At the moment of proof correction, I have, by the way, "logged" a highly interesting journey on the same time behind the G.C. "Director" class engine No. 5511, *Marne*, but the description of this must now be held over until a later issue.

Ere I conclude, acknowledgment of letters received during the past month is due to R. E. Abbott, R. S. Blackledge, A. Gaven, C. H. Frend, E. J. Fasham, A. H. Holden, C. E. Turner Jones, F. Lainson, C. H. Lott, E. W. Maybank, C. E. W. Neat, J. Pryde, M.Sc., F. Renfield, R. A. H. Weight and John Wrottesley the subject matter of whose communications is having my attention.

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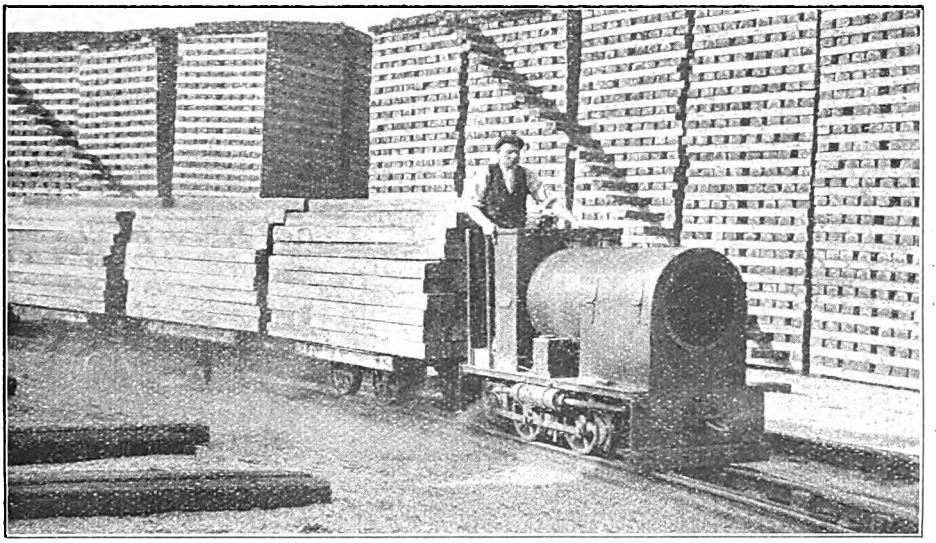

NARROW GAUGE PETROL LOCOMOTIVE AND TRAIN CONVEYING SLEEPER LENGTHS TO SAWMILLS AND DRILLING SHOPS.

Preservation of Railway Sleepers and Timbers.

By J. R. HIND, Press Section, L.N.E.R.

(*Photographs by "Sport and General."*)

ONE of the most important sections of railway maintenance work is the provision of an adequate and steady supply of sleepers and timbers which have been well matured and preserved against the varying climatic conditions of this country. The engineering departments of the railways work, as a rule, to renewal programmes which are drawn up so that every section of the line is renewed in turn, and the renewal of the rails, chairs, sleepers and the track generally is usually pushed ahead during the spring months in order that any permanent-way checks which may have to be instituted may not unduly interfere with the intensified summer working.

One of the most interesting sleeper creosoting works, which may be taken as typical of other similar works in different parts of the country, is the Hall Hills Sleeper Creosoting Works of the London and North Eastern Railway, situated about one mile from Boston station, and adjoining the Boston–Lincoln branch of the Great Northern Section. Here, amid rural surroundings, the works may be easily picked out by the large square stacks of raw timber sleeper lengths of Baltic and Oregon pine which are received in shiploads, and which are stacked up to mature for several months before being treated with preservative.

At the Hall Hills Creosoting Works, Boston, there is accommodation for 600,000 sleeper lengths, and at the time of the writer's visit about two-thirds of the accommodation was occupied by stacks. The whole of the works are admirably served by railway sidings which spread out fanwise from the central junction of the main running lines. The stacks are scientifically made up so that as much air as possible may circulate through them, and so that each one may be dismantled independent of the other. Specially constructed cranes, worked by electricity, after the type of ships' derricks, stack the sleepers and remove the topmost lengths.

The work of preservation is regulated

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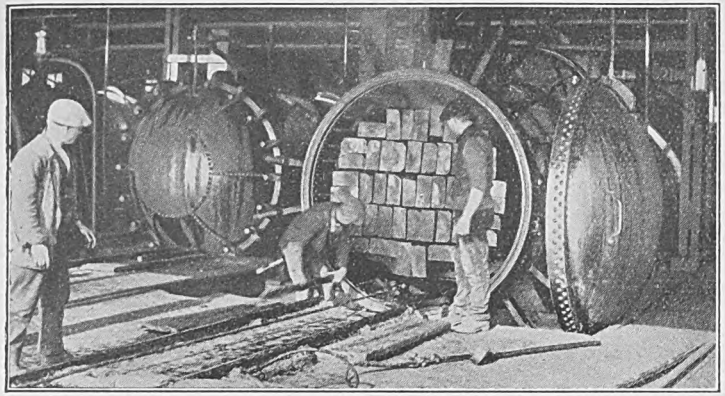
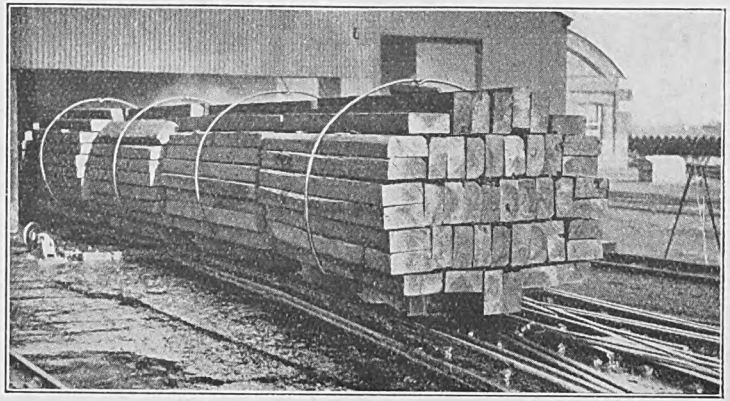
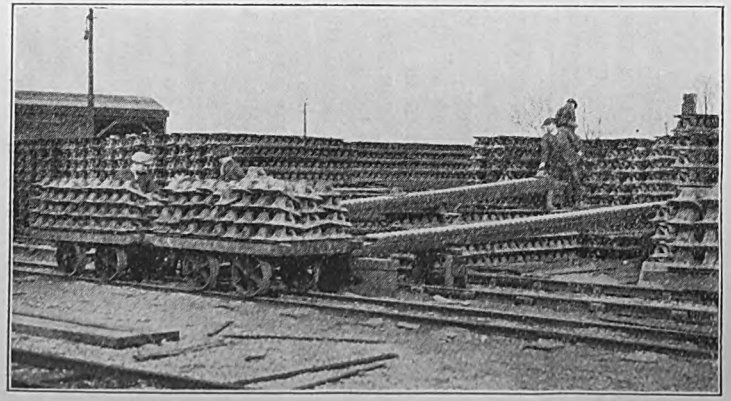


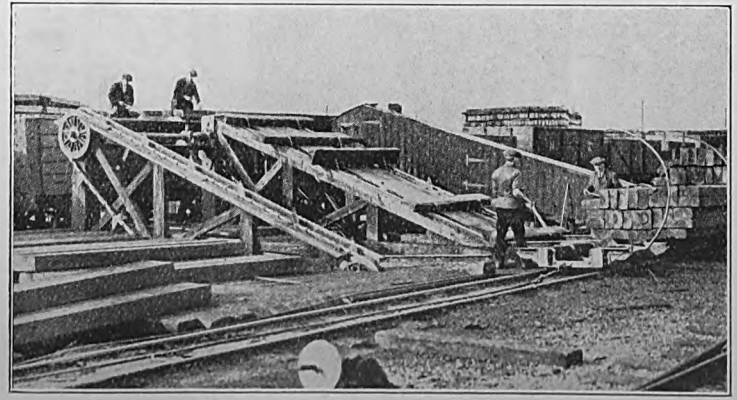
WITHDRAWING A "CRADLE" OF SLEEPERS FROM CREOSOTING CYLINDER.



NEW SLEEPERS AFTER EMERGING FROM CREOSOTING CYLINDERS.



UNLOADING CHAIRS FROM STACK.



TRANSFERRING SLEEPERS FROM CRADLE TO RAILWAY WAGON BY MEANS OF CONVEYOR.

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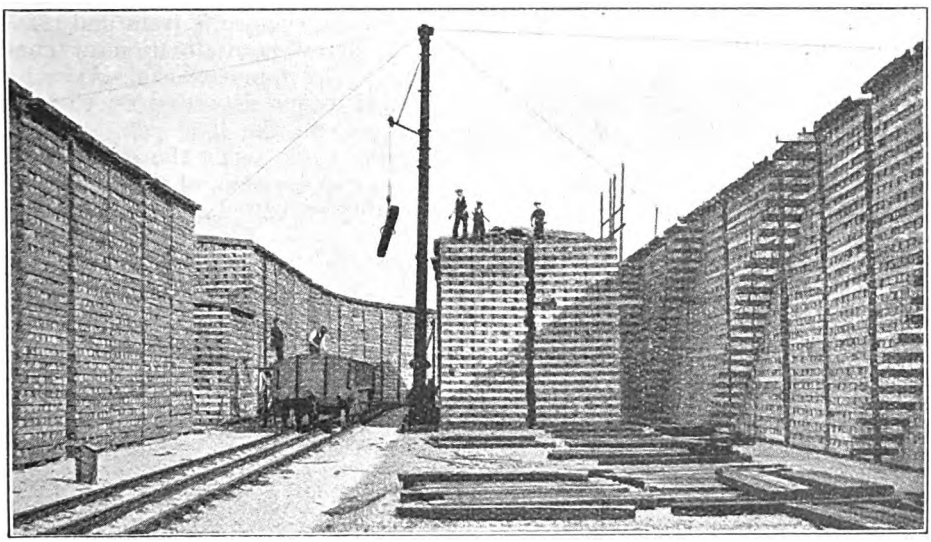
according to the demands made upon the creosoting works and a steady flow of new sleepers is daily sent away by special trains.

A petrol shunting locomotive is used for hauling the sleeper lengths which have matured from the stacks to the works, and a remarkably efficient little machine it is. As an instance of railway engineering department adaptability, it is interesting to put on record that the narrow-gauge petrol locomotive and its trucks run on a track composed of the outer rail of the ordinary railway lines, plus an additional light rail which has been placed at a suitable distance inside the ordinary 4-ft. mills to other low trucks or "cradles" as they are called, each capable of carrying 48 sleeper lengths and fitted with semi-circular steel guards to guide loading and to ensure that both cradles and sleepers will fit into the creosoting cylinders.

At the Boston Creosoting Works there are three pressure cylinders. Each cylinder is fitted with bolted doors at either end and steam-heating pipes, and a narrow-gauge track runs through from end to end. When the cradles are fully loaded with their complements, six cradles are hauled into the cylinders by means of a wire rope and an electric capstan. The connecting rails are then removed and the cylinder



DERRICK CRANE STACKING TIMBER IN SEASONING YARD.

8½-in. gauge. When the low cradle trucks reach the first workshop, in which are a series of saw mills, the cradles are run through a doorway alongside a sawing and boring machine which cuts the wood into the required standard length and bores two, three or four bolt holes as required completely through the wood. The preserving creosote is thus able to fully protect a very vital part of a sleeper, and to saturate completely those parts of the wood which are likely to have to withstand the most strain, *i.e.*, the holes which accommodate the bolts holding down the chairs.

A series of endless chains with spikes convey the finished lengths from the saw doors are closed and bolted. In the Inspector's office nearby, a series of gauges and dials give temperature pressure and vacuum existing within the cylinders from time to time, and the whole process is thus controlled scientifically to a nicety.

As soon as a cylinder has been sealed, the temperature is raised by steam-heating pipes to approximately 170° Fahr., and a partial vacuum created by pumping out some of the air. This ensures that the wood is thoroughly dried, and evaporates any stray moisture which may retard the progress of the creosote which is to follow.

Liquid creosote is then allowed to run into the bottom of the cylinders from service tanks below the surface of the

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ground, and this balances the partial vacuum which has been created. The pumps are then set to work and further creosote is forced into the cylinders until a pressure of 135 lbs. to the square inch is registered by the gauge. Certain qualities of wood require slightly more pressure and others slightly less, but long practice ensures that the creosote shall penetrate into the very core of the wood. As soon as sufficient pressure has been obtained in the cylinders, the pump ceases, and the unabsorbed creosote is allowed to run back into the service tanks. In about an hour's time, when the cylinders have been allowed to cool down, the doors are opened and the sleeper lengths, which have now become railway sleepers, commence their railway life.

The electric capstan wire rope hauls out the smoking cradles into the open, and it is noticeable how cleanly the operation has been performed by the heat, very little trace of liquid creosote or oozing being visible.

The new sleepers are next taken to a neighbouring workshop in which are chair-fixing machines. Spiked endless belts again pick up the sleepers one by one and convey them slowly across a low level bench where pieces of felt, chairs and bolts are laid on in the proper positions by hand, the chairs being made quickly available when required from outside stacks by roller runways. At the end of the travelling belt, the sleepers, felt chairs and bolts come under bolting machinery which screws down the bolts at a very rapid pace.

A further series of endless belts with spikes again take the completed sleepers, this time up a slope to waiting rail wagons which are linked up by a shunting engine to form an engineer's train and leave the works for various destinations at scheduled times. The completed chaired sleepers are by this means deposited on their actual locations on the line side, so that the relaying work, when the engineer is able to take possession of the line, is considerably expedited.

ORIENT EXPRESS AT PHILIPPOPOLIS (BULGARIA).

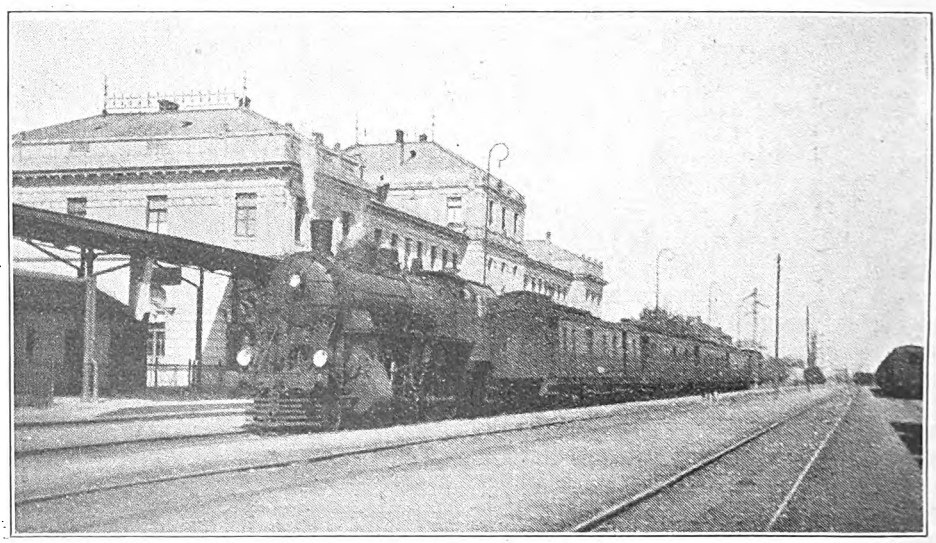

Photo.] WORKED BY GERMAN 4-8-0 LOCOMOTIVE. [*Lord Monkswell.*

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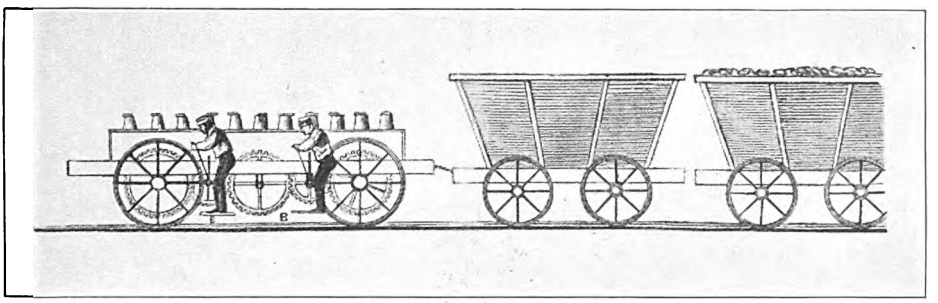
William Hedley and the Wylam Locomotives.

By R. E. M. BLEASDALE.

(*Photographs by the Author.*)

THE life of William Hedley is one of modest, unostentatious obscurity as compared with some of his contemporaries; but to the indefatigable zeal, the strong inventive faculty and the patience with which he prosecuted his experiments, we are indebted for a very important link in the early history of the locomotive. The tentative efforts of earlier engineers in this direction, and the partial success of Trevithick's Pen-y-darran locomotive, encouraged Hedley and those associated with him to produce an engine capable of doing all the transport work of the colliery, so that the primitive methods of horse haulage could be dispensed with.



EXPERIMENTAL CARRIAGE CONSTRUCTED BY WILLIAM HEDLEY.

William Hedley was born at Newburn near Newcastle-on-Tyne on July 13, 1779. He obtained some education at a school at Wylam, where he is said to have excelled in mathematics; and in 1800, at the age of 21 obtained the post of viewer at Walbottle colliery in Northumberland. Five years later he was appointed mining engineer to Wylam colliery, the proprietor of which was Mr. Christopher Blackett. Wylam colliery is situated 5 miles above the wharves at Lemington on the River Tyne, to which place the coal was conveyed by horse haulage along a wooden waggonway. The wooden wagon track was a distinct feature of the colliery districts of Northumberland and Durham in the early nineteenth century and was the means by which the coal was carried, in chaldron wagons, down to the shipping staithes on the Tyne and the Wear. Mr. Blackett, a year previously, having been convinced that steam would be more economical than horse power, had considered the advisability of purchasing a locomotive of Trevithick pattern, which was completed in the iron foundry of a Mr. Whinfield of Gateshead, by May, 1805; but its weight being about 5 tons, Mr Blackett decided that it was too heavy for his undulating wooden rails. Hedley thereupon, on the recommendation of a Mr. Thomas of Newcastle, straightened out the five foot wagon way, and relaid it with cast-iron plate rails of the type invented by James Outram in 1775; the work lasting until 1808.

Some idea of the nebulous stage to which the locomotive had reached may be gathered when we remember that in 1808 both the Pen-y-darran engine and Mr. Whinfield's Trevithick locomotive were doing duty as stationary engines; while the only tractive manifestation in that year was Trevithick's last effort, the mysterious "Catch-me-who-can," which is said to have run on a circular railway, near the site of Euston Square in London, for three months only. The separate inventions of Murdock, Symington, Four-

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Kensington Museum, Hedley was assisted by Timothy Hackworth, who at this time was foreman smith at Wylam Colliery*, and by Jonathan Foster, an engine wright whom Mr. Blackett had engaged in 1909. The experimental model having proved satisfactory in its movement, a full sized carriage was built and placed on the iron wagon-way. It was loaded with iron to represent the engine, and had fixed to its sides four platforms to accommodate men to work the windlasses. Attached to this machine were several loaded chaldron wagons, and it was then found that the transmission of man power through the medium of the spur gearing caused the wheels to revolve with sufficient tractive force as to draw the small train along the rails. Illustrated on page 445 is Hedley's experimental carriage, reproduced from "Who Invented the Locomotive Engine?" by O. D. Hedley, p. 12. "As the carriage, impelled by men approached Newburn, it was met by the late Mr. Robert Hawthorn, engineer" (of Walbottle) "father of the eminent engineers, Messrs. Robert and William Hawthorn, of Newcastle-on-Tyne."† "On the day following, in the colliery office, Messrs. Blackett and Hedley congratulated each other on the certainty that the coals would now be conveyed by "iron horses."‡ The building of an engine being a new departure at Wylam Colliery, and Hedley, Hackworth and Foster having had no experience in such work, Mr. Blackett, in 1811, engaged Thomas Waters, a Gateshead engineer, who was probably acquainted with the construction of the Trethithick engine built in Mr. Whinfield's foundry six years previously.

After encountering innumerable difficulties an engine similar in pattern to the Gateshead locomotive was fitted on the test carriage by Waters, Hedley and his staff and tried at Wylam towards the close of 1811 and early in 1812. No drawing or detailed description of this, the first, Wylam locomotive is known, but the following meagre particulars are recorded. "The boiler was of cast iron, the tube containing the fire went longitudinally through the boiler into the chimney, the engine had one cylinder and a fly wheel."* "The cylinder was 6 in. in diameter,"† and the spur gearing was modified to transmit the power from the cylinder downwards to the wheels, and probably approximated to the three spur wheels of *Puffing Billy*. There is no evidence to show that *Black Billy* had a blast pipe, or that the steam exhaust entered the chimney. "From the day the first engine went down the railway, the proprietor of a way-leave ceased not to complain of the great annoyance arising from the smoke, and from the noise the exhausted steam made on being discharged into the atmosphere."‡ Samuel Smiles, who, by the way, was not born until 1816, speaks of this engine in the following terms: "although this new locomotive was considered by Mr. Blackett to be an improvement on horse traction, its working was by no means satisfactory. It crept along at a snail's pace, sometimes taking 6 hours to travel 5 miles down to the loading place. The engine itself, constructed by incompetent workmen, often broke down; its plugs, pumps or cranks got wrong; and then the horses were sent out to drag it back to the shop. Indeed, it became so cranky that the horses were very frequently sent out following the engine, to be in readiness to draw it along when it gave up; and at length the workmen declared it to be a perfect plague."§ We may recognise in this description of the behaviour of the first Wylam locomotive, humour and exaggeration on the part of Smiles: but we have this laconic corroboration from Hedley himself, who says:—"it went badly, the obvious defect being want of steam."‖

These experiments in locomotion naturally attracted a number of interested persons, among whom were Robert Hawthorn of Walbottle, previously mentioned and presumably a friend of Hedley; Jonathan Foster's friend, George Stephenson, past whose birthplace the Wylam line ran and who was at this period con-

* See "Timothy Hackworth and the Locomotive," by Robert Young. The Locomotive Publishing Co., 1923, p. 41 *et seq.*

† "Who Invented the Locomotive Engine?" p. 13.

‡ *Ibid.*, p. 14.

*Wm. Hedley's letter to Dr. Lardner, Dec. 10, 1836.

† Life of George Stephenson, by Samuel Smiles, 1857, p. 76.

‡ "Who Invented the Locomotive Engine," pp. 24, 25.

§ "Life of George Stephenson," pp. 77, 78.

‖ Wm. Hedley's letter to Dr. Lardner.

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by intermediate spur gearing carried he power to the axles of the 3 ft. 3 in. lriving wheels. A footplate was provided or the driver at the spherical end, and the ireman was accommodated with a platform n the tender which contained receptacles or coal and water. The weight of the ngine in working order was 8 tons 6 cwts., nd of the tender 4 tons 6 cwt. *Puffing Billy* was completed in the autumn of 812 and "drew eight loaded wagons t the rate of nearly 5 m.p.h. Matthew Nicholson, who wrought on the railway rom 1807 to 1830, states, that in about weeks after it commenced work, it lrew regularly and well, 10 wagons at he rate of 5 m.p.h., travelling with the mpty carriages about 6 miles and a half, nd doing the work of ten horses."*

On its completion, Hedley applied for a patent, but this application was opposed by William and Edward Chapman who obtained a patent in December, 1812, for a chain worked locomotive, which when ried at Hetton colliery near Newcastle, n October, 1813, proved impracticable. Hedley's patent was dated March 13, 813†: and Mr. Blackett who, as proprietor of the "Globe" newspaper, was probably n London at this time, wrote: "Dear Hedley, your letter of the 6th is very gratifying, as it removes all doubt of the utility of your patent machine, which I trust will afford a recompense for your ngenuity; when I return home I hope o find the 'iron horse' has taken regularly o his collar, and doing his work with becoming steadiness . . . I am very sincerely yours, Chr. Blackett."‡ Strictly speaking, *Puffing Billy* did not possess a blast pipe; but the exhaust steam passed from the cylinders through an eduction pipe into the chimney, causing the puffing noise that was considered so objectionable by those through whose land the line passed. Subsequently, but the exact date is not known, a silencing chamber was placed on the boiler, in which the force of the exhaust steam was lessened, so that it reached the chimney in an expended condition. Speaking of this steam exhaust Mr. Colburn says:—"any admission of high pressure steam, will, if directed upwards, produce a draught, and however much the steam may be retarded in reaching the chimney, its final escape therein generates the action attributed to the 'blast pipe.'"* *Puffing Billy* continued to work at Wylam colliery until 1862, when the photograph shown was taken (page 448). In 1865 it was transferred to the Science Museum, South Kensington.

One very unfavourable feature of the plate rail was the continual silting up of the grooved surface of the rails, thus lessening considerably the adhesion of the engine and wagon wheels. "If the wind blew from the north or south, all the extraneous matter in the vicinity was arrested by the flange of the corresponding line of rails. If from the east or west, some parts of the line were clean, other parts choked . . . As the workmen expressed it, one line of rails or the other was always full."† Owing to the light nature of the cast-iron plate way and the frequent breakages of the rails, it was considered necessary to build an engine of similar size but with the weight more distributed. *Wylam Dilly* the third locomotive, therefore had eight wheels instead of four, and commenced work in August, 1813, page 446. There were several important details which distinguished *Wylam Dilly* from its predecessor. The boiler was fitted on a strong wooden frame which was supported by two bogie-like trucks, each having four wheels; and the eight wheels were coupled together by spur gearing to make them all available for adhesion. It may be that the object of providing the engine with trucks resembling bogies was to allow of lateral movement when negotiating curves. The additional shaft beneath the boiler frame, to which the cranks were fixed, was enclosed within a casing bolted to the frame above, which at its base carried the lower shaft to which the spur wheels of the trucks were geared, thus making radial action possible. As with several other important details in the early history of the locomotive, the theory that these four wheeled trucks were bogies or revolving under carriages, is not accepted by all locomotive historians

* "Who Invented the Locomotive Engine?" p. 22.

† "Repertory of Arts," vol. xxii, Specification No. 3666.

‡ "Who Invented the Locomotive Engine?" p. 33.

* "Locomotive Engineering," by Zerah Colburn, 1871.

† "Who Invented the Locomotive?" p. 28.

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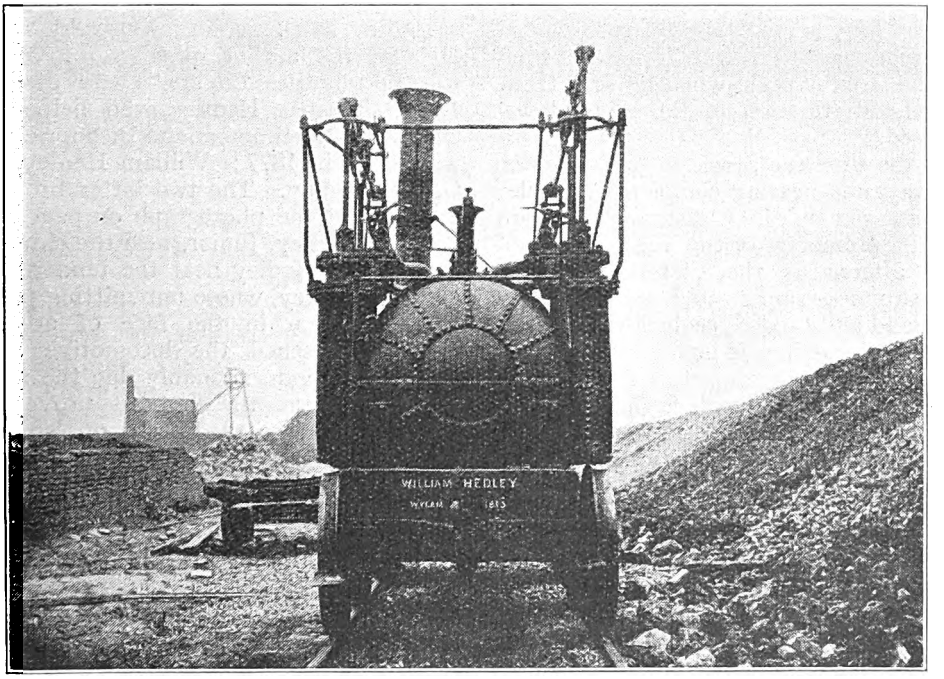
Hedley, Junior, near Newcastle, where the photograph on page 450 was taken. It was exhibited at the Stephenson Centenary in 1881 and finally removed to the Science and Art Museum, Edinburgh.

The Wylam locomotives having proved a commercial success, in spite of pronounced hostility, by 1814 seven other locomotives were built. Blenkinsopp's rack rail engine, for which a patent was obtained in 1811, continued to work at Middleton colliery near Leeds, and two other engines of the same type were built for The Kenton, Fawdon & Coxlodge collieries near New-



HEDLEY'S "WYLAM DILLY."

castle; Brunton's horse-leg locomotive, patented in May, 1813, worked at Newbottle colliery until 1815 when it exploded with fatal results; Chapman, who had opposed Hedley's patent in 1812, now designed an *eight wheeled* engine for Lambton colliery, which is said to have closely resembled *Wylam Dilly*; Stephenson designed and built the *Blucher* for Killingworth colliery; and a William Stewart of Newport, Monmouthshire, built a locomotive for the Lydney & Lydbrook Railway.* Timothy Hackworth, who had assisted Hedley in building the locomotives left Wylam for the post of foreman smith at Walbottle colliery in 1816.* Hackworth's achievements as manager and contractor of the Stockton and Darlington Railway and as a locomotive engineer are fully set out in Mr. Robert Young's book "Timothy Hackworth and the Locomotive" The political history of this period was very unfavourable to the introduction of machinery; the unpopularity of the Georgian dynasty, the exhausted state of Europe in consequence of the Napoleonic wars, the prohibition of imported wheat, a series of disastrous corn harvests and the consequent impoverishment of the working classes, resulted in a number of riots throughout the country. In the manufacturing towns machinery and plant were destroyed; but the Wylam district was not materially affected except by a strike among the keel men of the river Tyne. Hedley, who since 1808, had been the owner of a coasting vessel, fixed a beam engine in a barge which he contrived to work with paddles, and towed the keels

* See *The Engineer*, July 11, 1924, p. 38.

* "Timothy Hackworth and the Locomotive," p. 77.

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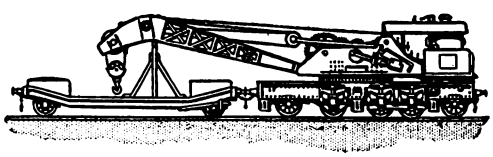
or coal barges to the coal shoots. Hedley was a very busy, if not an ambitious, man; with all his duties at Wylam colliery he also contrived to manage The Blegill lead mine near Alston, Cumberland. In 1824 he became the owner of Crow Tees colliery near Durham, and shortly afterwards acquired Callerton colliery near Wylam where he introduced an improved method for pumping water, which met with much adverse criticism; the system was, however, adopted in many parts of Northumberland and Durham. "The demand for coals increasing, Mr. Hedley was engaged in building an engine at his collieries with teeth wheels"; (presumably of *Puffing Billy* type) and part of the materials had been got from the Busy Cottage Iron Works, when he sold them, and the destination of the mineral was changed."*

At the time the Stockton & Darlington Railway was nearing completion, Hedley was engaged by Mr. Christopher Tennant and the promoters of the Tees and Weardale, afterwards the Clarence Railway Company to examine and report on the Auckland and Coxhoe coalfields. In 1825 Hedley gave evidence before a parliamentary committee in respect of ten collieries including Coxhoe, which he had recently acquired, with the result that notwithstanding determined opposition on the part of The Stockton & Darlington Railway Company, a bill for the Clarence Railway was passed in 1828; and it may be assumed that Hedley was for a time general manager as he obtained a locomotive named *Tyneside* for this small railway from Messrs. R. & W. Hawthorn & Co. in 1835. Hedley removed from Wylam to Shield Row in 1828, when he extended his activities by renting South Moor Colliery. From Shield Row, on December 10, 1836, he directed a letter to Dr. Lardner, the author of "The Steam Engine," giving a summary of the history of the locomotive, and vindicating his claim to having "established the character of the locomotive engine . . . as an efficient and . . an economical prime mover."* William Hedley subsequently retired to Burnhopeside Hall near Lanchester, Co. Durham, where he died on January 9, 1843. He is buried at Newburn near Newcastle, the place of his birth.

Hedley had four sons: Oswald Dodd Hedley, the author of "Who invented the Locomotive Engine," who died in 1882; Thomas Hedley, who helped to endow the Northumberland Bishopric, and who died in 1877; William Hedley and George Hedley. The two latter brothers are seen in the photograph on page 450. William Hedley, Junior, near the chimney and George Hedley near the tender. To William Hedley, whose unremitting perseverance, often in the face of adverse criticism, rescued the locomotive from oblivion, is unquestionably due the merit of having been the first to prove the adhesion of smooth wheels on smooth rails, and to establish this form of locomotion as a permanent success. In the history of the locomotive engine he is one of the links that connect the genius of Richard Trevithick with that of George Stephenson; and it is doubtful if the evolution of the railway engine would have been quite the same without the persistent efforts of William Hedley.

* "Who Invented the Locomotive Engine?" p. 86.

* *Ibid.*, pp. 34-37.



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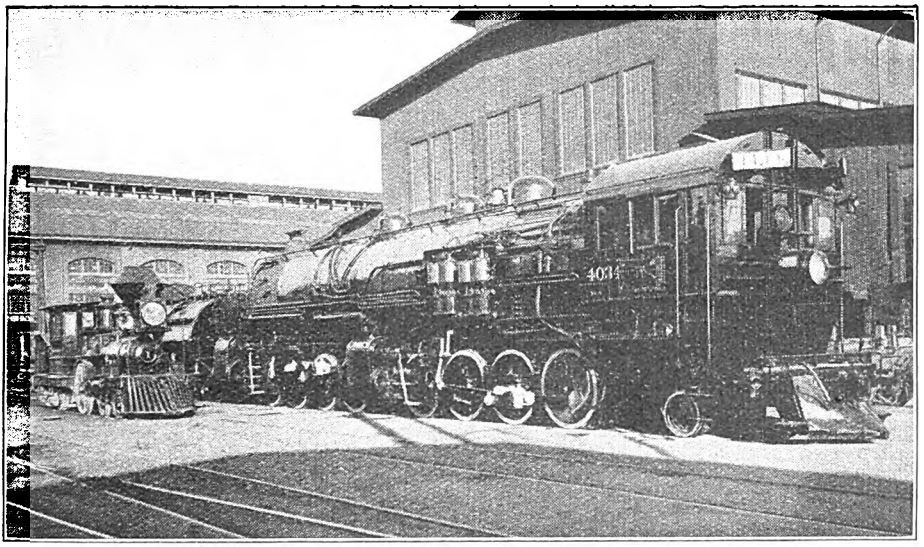

SOUTHERN PACIFIC RAILWAY No. 1 "GOVERNOR STANFORD" (BUILT 1863) ALONGSIDE MODERN 2-8-8-2 ARTICULATED LOCOMOTIVE.

Southern Pacific Trains and Locomotives.

IN THE RAILWAY MAGAZINE for May, 1926, an article "Express Trains in the United States" described conditions east of Chicago. In the extreme West—on the Pacific Coast—good work, also, is performed. Mr. George Ross, writing from San Francisco, California, sends particulars of passenger trains on the Southern Pacific Railway. The locomotives employed are superheated of the 4-6-2 type, with two cylinders 22 by 28 in., coupled wheels 6 ft. 5 in. diam., steam pressure, some with 200 lb. per square inch, and others 210 lb.; the tractive effort being 29,920 and 31,420 lb., respectively. The distance from Oakland Pier to Roseville is 103 miles. From Port Costa, 27·6 miles from Oakland Pier, to Benecia, 1¼ miles, the trains are conveyed by ferry, for which 30 minutes are allowed in the schedule. Treating the ferry as one stop, there are four intermediate stops in the 103 miles. There are gradients of 1 in 155, 250, 333, &c., and curves of 10, 15¼, and 14½ chains, &c. Trains of 1,070 American (2,000 lb.) tons have made the run in 3 hr. 41 min.; with 1,032 American tons in 3 hr. 35 min.; and with 891 American tons in 3 hr. 29 min. The average weight and time of 29 runs are 976 tons and 3 hr. 38 min.

On the Gerber-Oakland Pier route, of 185 miles, there are five stops, including the ferry, for which 23 minutes are allowed. These trains are worked by superheater Atlantic (4-4-2) engines, equipped with feed-water heater. Except that the boiler pressure is 10 lb. higher, the dimensions approximate to the *Aberdonian* class of our North British type of locomotives. The average weight of train on eight trips was 636 American tons, and the average time 5 hr. 2 min. Gradients include 1 in 150 and 155, and curves of 14½ chains and 17½ chains radius are encountered.

We append some interesting photographs, showing the development of locomotive power on the Southern Pacific Railroad. The small engine No. 1, to the left of the photograph on this page, is *Governor Stanford*, put into service in 1863; with tender it weighed 50 American tons, was 50 ft. long, and had a tractive effort of 10,500 lb. *Governor Stanford* was the first locomotive placed in service on the Central Pacific Railroad, the parent organisation of the Southern Pacific Railroad. It was brought round Cape Horn, arriving in San Francisco on the *Herald of the Morning* on August 19, 1863. It was transported to Sacramento by river boat, where it was assembled, and made its

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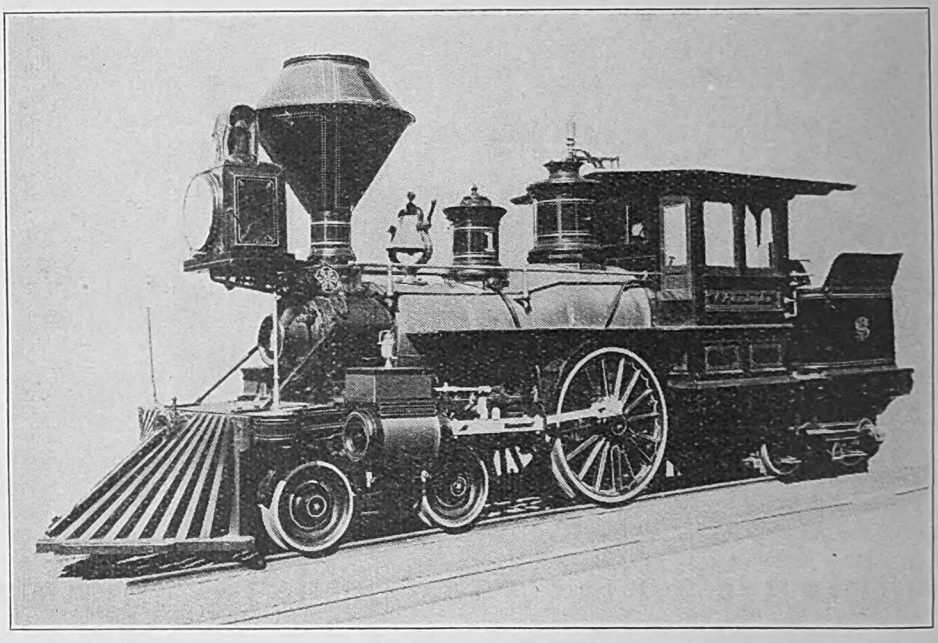
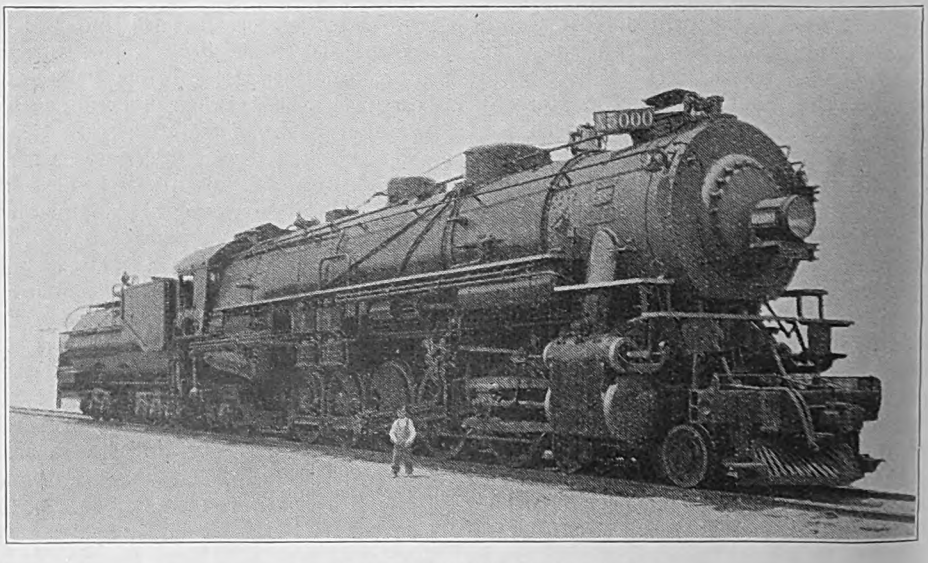


4-2-4 TANK ENGINE "C. P. HUNTINGTON," CENTRAL PACIFIC RAILWAY, No. 3, BUILT 1864.



4-10-2 LOCOMOTIVE, BUILT 1925.

1864-1925 ON THE SOUTHERN PACIFIC RAILWAY, U.S.A.

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maiden trip November 10, 1863. Two miles of track had been laid on the Central Pacific out of Sacramento. The locomotive was named in honour of the then Governor of California, who was first president of the Central Pacific Railroad. The locomotive was used in general work during the construction of the Central Pacific, and later in passenger and freight service. It is now located in the museum at Stanford University, California.

The *C. P. Huntington*, as exhibited on page 454, is a 4-2-4 tank engine, was No. 3 of the Central Pacific Railroad, weighed 19½ American tons, was 29½ ft. long, had cylinders 11 by 15 in. and single drivers 4 ft. 7 in. diam. The tractive effort was 3,510 lb. It was put into service in 1864, and named in honour of one of the builders of the Central Pacific Railroad. This engine was used in general service during and after the construction period. It is still in serviceable condition, and is now reserved for exhibition purposes and located at Sacramento.

At the other end of the scale are No. 5000 and No. 4034 of the Southern Pacific Railroad. The former, illustrated on page 454, is of the 4-10-2 type, built in June, 1925, weighs 343 American tons, is 101 ft. 1 in. in length, and has a tractive effort of 96,530 lb. The engine has three cylinders, the third being inside the frames, slightly higher than the outside cylinders. These locomotives haul passenger and freight trains over the mountain lines of the Central Pacific Railroad. The type is the most powerful and economical non-articulated (single engine unit) locomotive yet built. At a speed of 25 m.p.h., up a grade of 1 in 46, No. 5000 has 25 per cent. more hauling capacity than that of any previous locomotive in use on the Southern Pacific Railroad.

No. 4034, which is shown to the right of the picture on page 453, is a 2-8-8-2 Mallet oil-burning locomotive recently introduced on the Southern Pacific Railroad for hauling the extremely heavy freight trains over 1 in 45 gradients.

A feature of this type is that the engine runs firebox first, an enclosed cab being fitted over the footplate, so that the crew is right in front of the train, the tender, containing the oil fuel and water, is coupled to the smoke-box end of the engine. This arrangement has been in use on some locomotives in Italy for many years past.

ON THE FEDERATED MALAY STATES RAILWAYS.

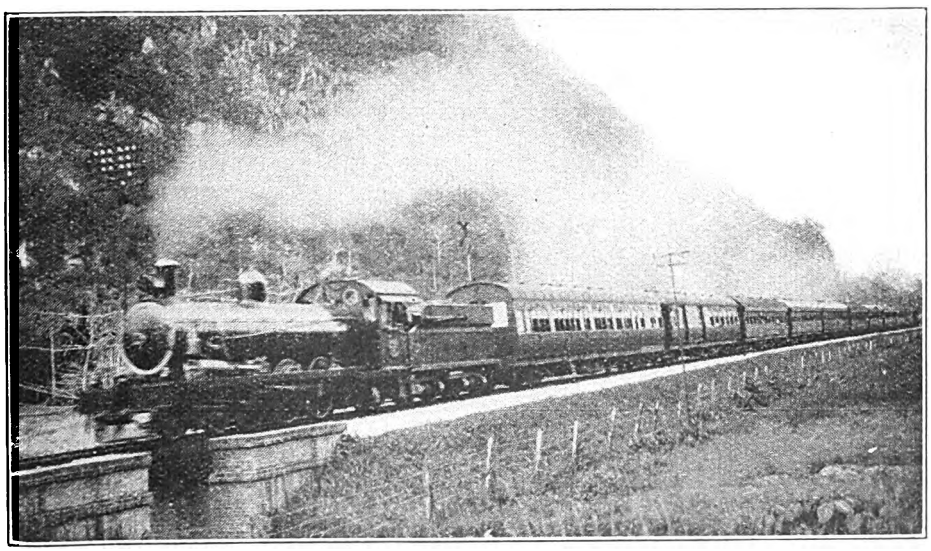

Photo.] [*Lt.-Comm. F. R. Porter.*

TRAIN NEAR TAIPING. 4–6–2 ENGINE, No. 191.

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The State Railways of Australasia.

By CHARLES TRAVIS, M.Inst.T.

VIII.—WESTERN AUSTRALIAN GOVERNMENT RAILWAYS.

(Continued.)

THE train mileage run during the year ending June 30, 1924, was 4,839,285, an increase of 333,896 over the previous year. Of this, 1,142,039 was mixed train mileage, and allocating this on the usual basis of one-third passenger and one-third goods, passenger train mileage works out at 1,923,358 and goods 2,915,927. This latter figure is interesting, as it is 252,147 miles less than the figure for 1914-15, although in 1923-24 the ton-mileage of paying goods was greater by 30,000,000 than in 1914-15. In other words, the volume of goods traffic increased by 13·43 per cent., but the goods train-miles decreased by 8·64 per cent., indicating keen attention to the question of economical haulage. The percentage of empty truck mileage to the total truck mileage was 28 per cent., as against 31 per cent. in 1922-23, equal to a reduction of just on 10 per cent., and is to some extent the natural corollary of confining the application of the specially low "manure" rate to the months when trucks are being sent from the coast to the wheat districts for loading.

The average mileage each truck run per day during the whole year was 22 miles, an increase of 2 miles, or 10 per cent., when compared with the year 1922-23. Improvement in the loading of wagons has enabled the department to postpone expenditure on additional stock, and although the average tonnage carried per vehicle of 7 tons 3 cwt. is still considered low, it is a big improvement on previous years. In this regard the disadvantage of a small and scattered population is felt. With such a wide range of territory and so few people to serve, an immense amount of light roadside traffic is handled: consequently great difficulty is experienced in utilising the wagon stock to anything like a reasonable extent. The average length of haul increased from 80·08 to 83·62 miles, mainly on account of longer transits of wheat.

Passenger traffic on the Western Australian Government Railways in 1925 showed an increase of 330,357 passenger journeys in suburban traffic and a decrease of 27,481 in country traffic, but the earnings were increased over the previous year by £9,526, and £6,982, respectively. Total passenger journeys for the year were 18,133,168, an increase in the suburban area and the provision of numerous excursion trains having stimulated the traffic. During the last few years great strides have been made in the improvement of the passenger accommodation. Electric lighting has been introduced generally into the passenger stock, and the provision of dining and buffet cars has been extended to the country trains. The catering arrangements are let out to contractors.

Rail motor coaches are run on two services. One is between Albany-Denmark and Albany-Mount Barker and the other between Narrogin-Williams and Narrogin-Wagin. Three cars are in stock but one is used for relief purposes. A deficit on the working was shown last year, but it is considered that the operation of the coaches is desirable as the running of the same service with a steam train would have involved a much greater loss.

The possibility of improving the scheduled load of trains is constantly being watched, and in a recent revision of the load table provision was made for increased engine loads on various sections. The average scheduled load of goods and mixed trains run last year was 363 tons, an increase of 4 per cent. over the 349 tons of the previous year. The average actual load, including weight of vehicles, was 239 tons, against 234 the previous year. The position with regard to vacuum brake equipment obviously has an important bearing on this question, and in this regard it is to be noted that 7,231

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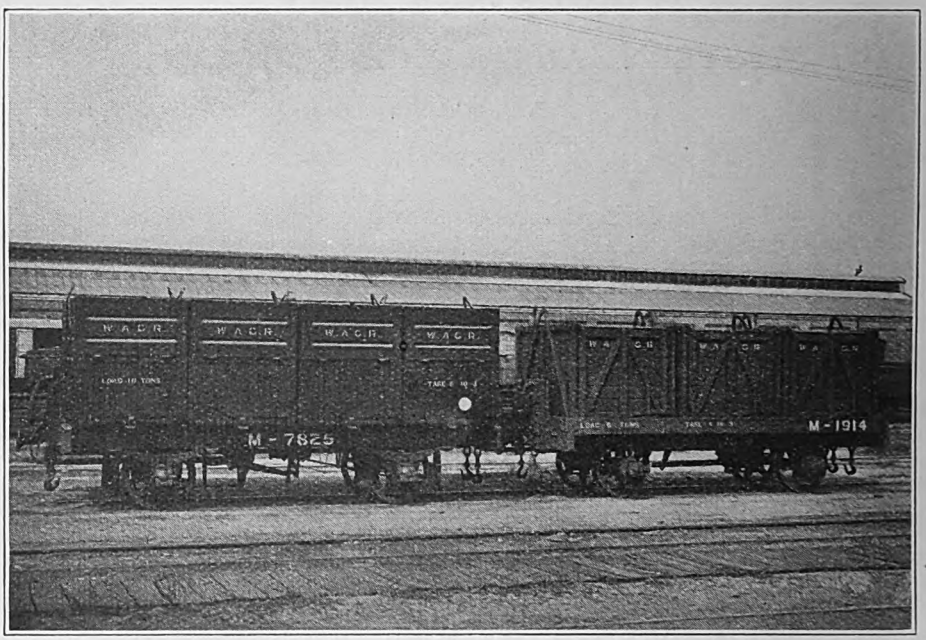
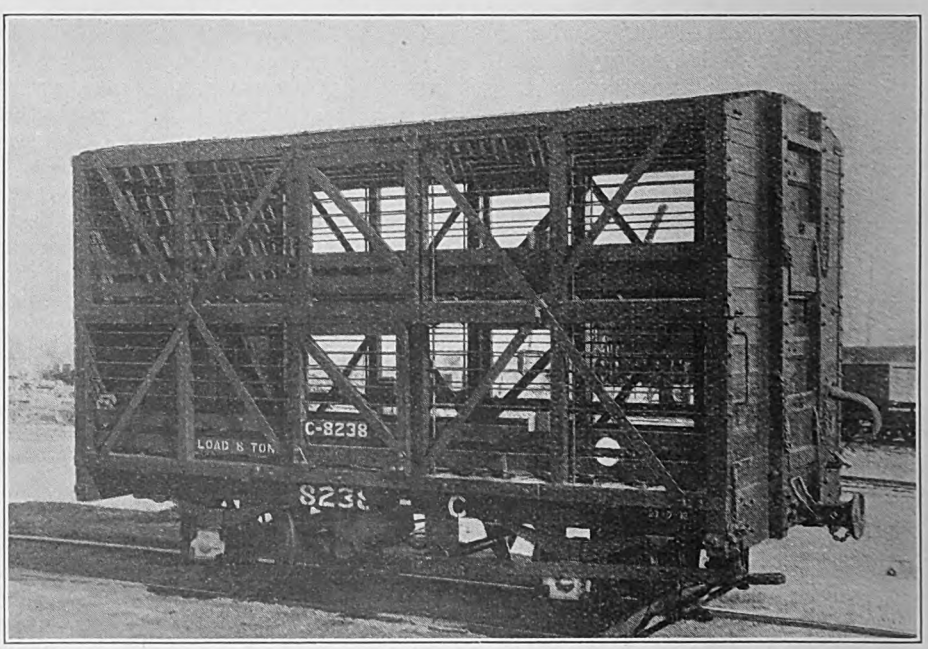


CLASS "M" COAL BOXES, SHOWING NEW AND OLD TYPES.



DOUBLE-DECKER SHEEP WAGON OF 8 TONS CAPACITY.

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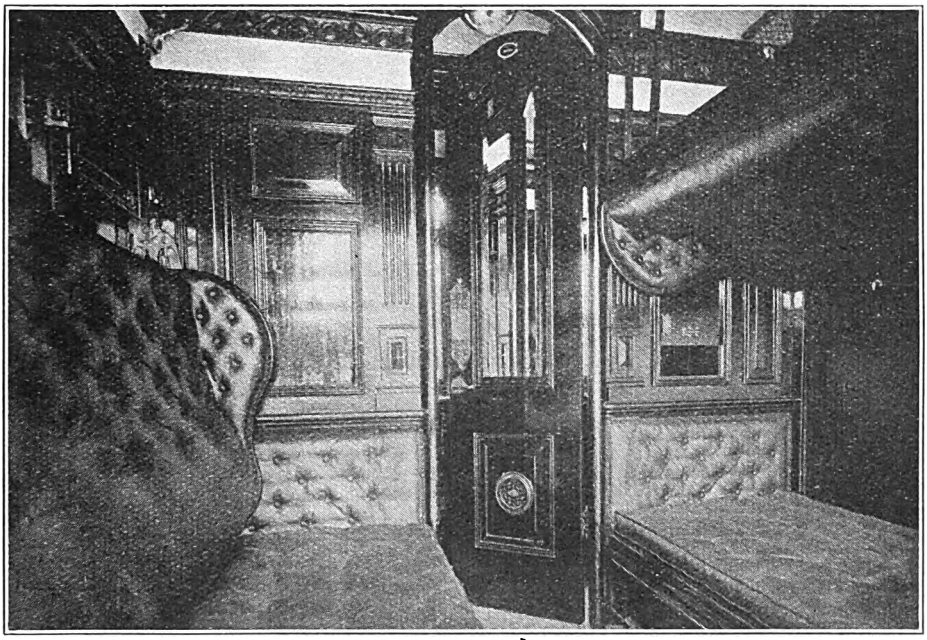
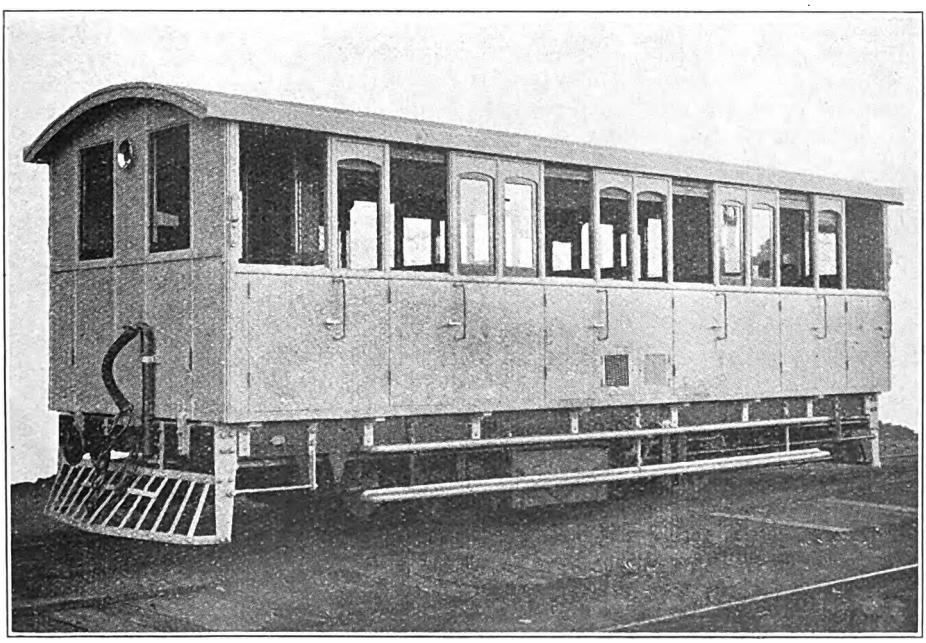


INTERIOR OF FOUR-BERTH COMPARTMENT, FIRST-CLASS CORRIDOR CAR.



RAIL MOTOR COACH FOR PASSENGER SERVICE.

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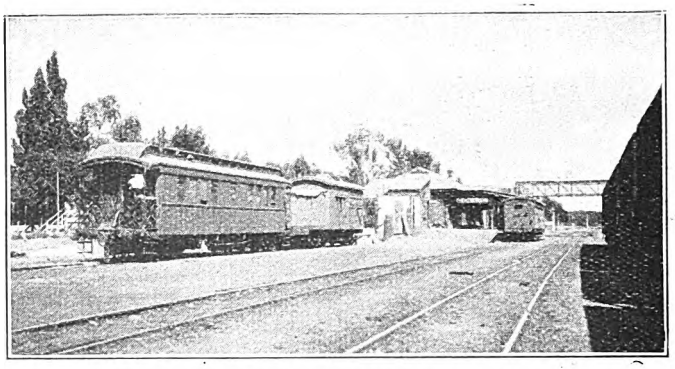


COLLIE STATION, A CONCENTRATION POINT FOR COAL TRAFFIC, SHOWING INSPECTION CAR A.L. 37 ON LEFT.

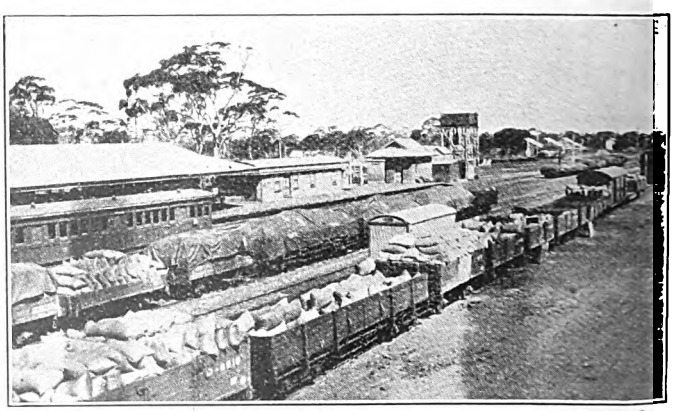
wagons, or 70·81 per cent. of the total stock, is fitted complete, and 2,865, or 28·05 per cent., fitted with train pipe only.

An interesting point brought out in the yearly report is that hay, straw, chaff, wheat and fertiliser traffic represented 38·56 per cent. of the ton-miles hauled, but only produced 19·92 per cent. of the earnings, whereas general goods represented 6·04 per cent. of the total haulage for 20·50 per cent. of the earnings. In other words, as the Commissioner points out, "service constituting 38½ per cent. of the total work was performed for the agricultural sections of the community for less revenue than was received from 6 per cent. of the total services performed for the whole of the community."

Train Services.

While there is, of course, a purely passenger train service working on many lines in Western Australia, it is essential, owing to the characteristics of the country, to run a very large number of mixed trains. Mixed train mileage, in fact, is 1,142,039 against the country passenger train mileage of 930,935. The working of these mixed trains is, however, carefully watched, and as soon as it is noted that the traffic offering is sufficient to warrant the running of a purely passenger train steps are taken to improve the service. The Railway Department is keenly alive to the undesirability of a mixed train service, owing to the relative slowness of the journey and the inconvenience to passengers, and naturally prefers, for many reasons, to run a passenger service separately wherever practicable.

For a number of years it has been the practice on the Western Australian Government Railways to make a general revision of the time-table twice a year, and in order to ensure the best possible results a conference of the principal officers of the running staff is called to frame the new issue. This conference is presided over by the Assistant Chief Traffic Manager, and includes representatives of the Commissioner and the Way and Works Branch, together with the Superintendent of Locomotive Running, District Locomotive and Traffic Officers, the principal transport officers and a delegate from each of the locomotive and traffic employees. The conference is opened by the Commissioner of Railways, who, after reviewing the operating statistics, and commenting on any outstanding feature of the time-table then operating, outlines his policy for the ensuing six months. Each district is then taken in turn, and the proposed running analysed with a view to fulfilling the general



WAGIN JUNCTION STATION, ON THE MAIN SOUTHERN LINE TO ALBANY, SHOWING WHEAT TRAFFIC READY FOR DESPATCH TO FREMANTLE FOR SHIPMENT.

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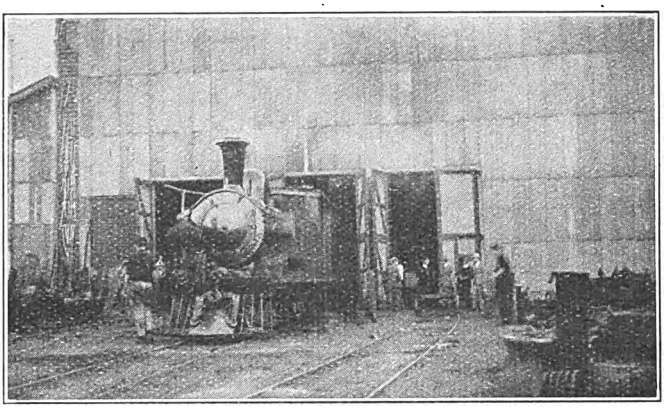
requirements of the system. In this way a time-table is framed which is calculated to ensure economical working with the highest degree of efficiency. The findings are then submitted to the Commissioner, who fixes the date from which the revised working shall come into force, provided the conditions outlined in his policy have been met.

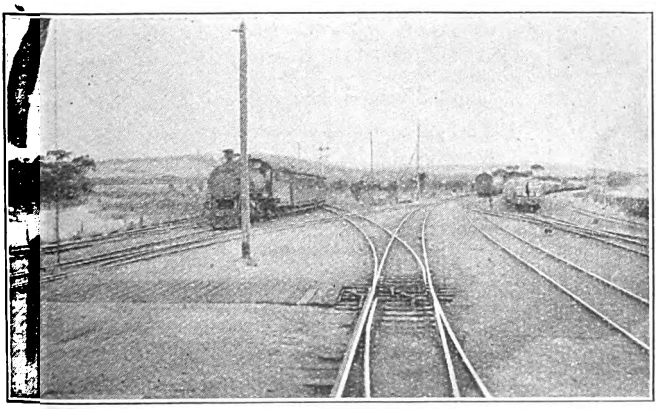


EXTERIOR OF ONE OF THE LOCOMOTIVE REPAIR SHOPS AT MIDLAND JUNCTION.

Midland Junction Workshops.

The locomotive workshops, machinery and staff, were originally at Fremantle, but were transferred to Midland Junction during 1904–05, and are now housed in substantial buildings which comprise pattern-making, blacksmith, boiler, car and wagon, paint, machine, locomotive erecting, electrical and coppersmith shops, and brass and iron foundry. At West Midland are situated the permanent-way shops, which deal with points and crossings and bridge work of all descriptions, as well as attending to petrol-driven inspection trolleys and gang cars. The railway general store, which carries material to the value of £500,000, is also located in the workshops area. Almost all the machines in the shops are electrically driven, either in groups or individually, while the work of replacing the steam-driven air compressors, hydraulic pumps and blowing engines by electric-driven plant is nearing completion.

The total enclosed workshops area is 167 acres; of this, 18½ acres are occupied by buildings; and there are 23⅓ miles of sidings and lines of way. The capital cost of the land, buildings, and machinery, including sidings, amounts to £718,000. There are now about 1,500 men employed, and the yearly amount paid in wages is £281,181. Besides forming the repairing centre for the locomotive, carriage and wagon plant of the Government Railways, the locomotive shops undertake the construction of a certain number of locomotives, carriages, tramcars, wagons and motor trolleys in an up-to-date and efficient manner. The workshops are very well laid out and compare favourably with other similar establishments in Australia, as a big programme for the extension of the plant, and the replacement of obsolete machinery has recently been in progress. The most up-to-date and efficient labour-saving machinery has been installed. The Chief Mechanical Engineer is Mr. E. A. Evans.



SPENCER'S BROOK JUNCTION. TRAIN FROM NORTHAM ON LEFT, LINE FROM NARROGIN ON RIGHT; ON EXTREME RIGHT WAGONS LOADED WITH WHEAT FOR SHIPMENT. VIEW TAKEN FROM MOVING TRAIN.

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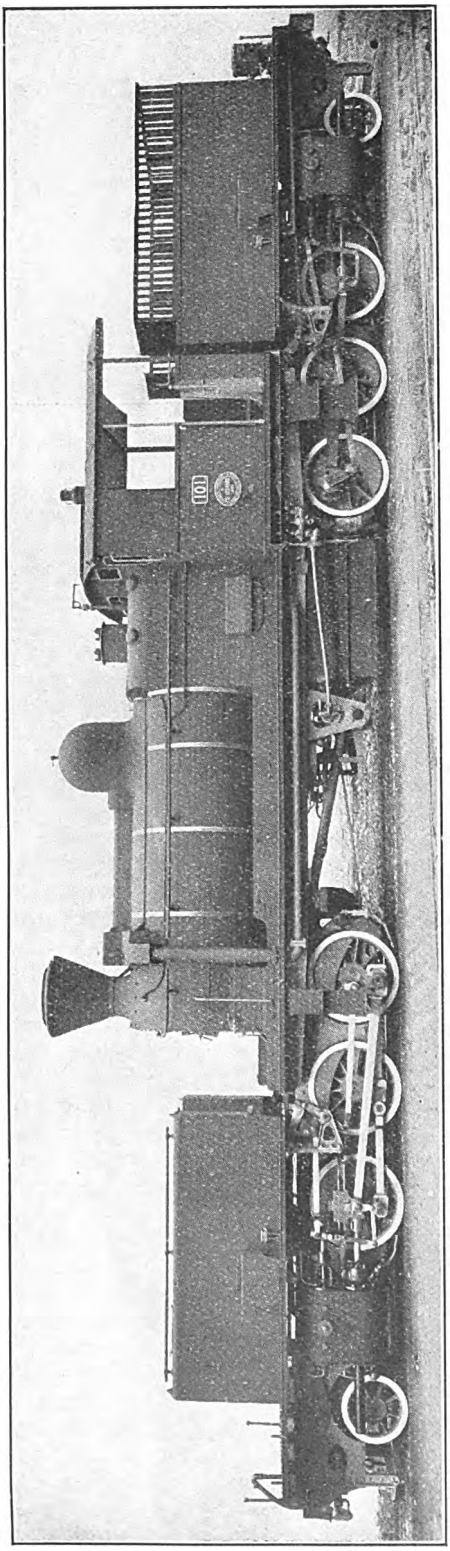

GARRATT LOCOMOTIVE FOR THE MADAGASCAR RAILWAYS.

We are indebted to the Adr. Directeur-Gérant of the Société Anonyme de Saint-Léonard, Liége, for a photograph, reproduced herewith, and dimensional particulars of the new 2-6-6-2 Garratt patent articulated locomotive constructed at Liége to the order of the French Government for service in Madagascar.

The engine follows closely along the lines of modern French design. The boiler, which carries a working pressure of 170 lb. per sq. in., is equipped with a superheater, and is designed for burning wood fuel. It will be noted that the chimney is fitted with a spark arrester.

The cylinders are arranged outside the frames with piston valves on top. They have a diameter of 14 3/16 in. and a stroke of 19 11/16 in. Steam distribution to the cylinders is effected by Walschaerts valve gearing. Steam sanding gear is applied to the leading and trailing coupled wheels of each engine group.

The principal dimensions are as follow:—

Cylinders, diameter	14 3/16 in.
,, stroke	19 11/16 in.
Coupled wheels, diameter	3 ft. 3 1/4 in.
Leading and trailing truck wheels, diameter	2 ft. 3 1/2 on.
Boiler working pressure	170 lb. per sq. in.
Wheelbase, coupled, each group ..	7 ft. 10 in.
Total length overall	53 ft. 9 in.

In working order the locomotive weighs 71 tons 7 cwt., of which 58 tons are available for adhesion. The tractive effort at 60 per cent. is 20,366 lb.

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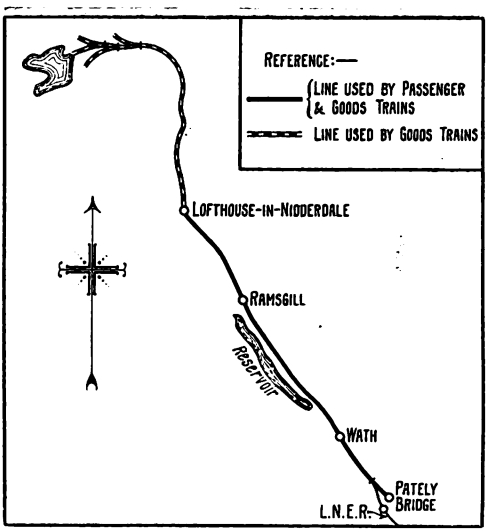
The Nidd Valley Light Railway.

By A. P. HERBERT.



SKETCH MAP OF LINE.

WHILE most of the people of Great Britain know more or less something of the four large railways of these islands, very few other than local residents have ever heard of the numerous light railways giving communication between the generally less-densely populated regions. One of these light railways, probably the least known of all, is the Nidd Valley Light, situated in the midst of the beautiful scenery of the North Riding of Yorkshire. The railway prides itself on being the first municipal-owned railway in the British Isles, being the property of the Bradford City Corporation.

Towards the end of the nineteenth century the inhabitants and land-owners of Nidderdale were desirous of having a railway built in order to connect them with the more important parts of England. The scheme for building the railway was talked about for a number of years in the district before it took practical shape. At last, in 1901, a syndicate representing the interests of Nidderdale approached the Light Railway Commissioners for permission to build the required railway. After considering the matter, powers were given to the Power & Transport Co. Ltd. to build a passenger and goods light railway from Pateley Bridge to Lofthouse-in-Nidderdale. Plans were at once made for the proposed line, but owing to a shortage of available funds they could not be carried out, and for a time it looked as if the whole venture would come to nothing.

Meanwhile, the Bradford City Corporation had been at work on their new waterworks at Angram. Owing to the enormous increase in the population of Bradford, the waterworks had to be greatly enlarged, and to do this hundreds of navvies with their wives and families had to be conveyed there, together with machinery and raw material. Also daily provisions had to be taken there for the inhabitants. To transport everything by road was out of the question, for even to-day there are no roads in the vicinity of Angram. Therefore the only feasible way was to complete the much-talked-about light railway. The Bradford Corporation then took the matter in hand and, in 1903, entered into a provisional agreement for the purchase from the original promoters of their interest in the Light Railway Order of 1901. This was obtained for a sum of £2,000. The Light Railway Commissioners at first objected, as it involved permission for municipal authorities to build a railway, especially as the proposed line was outside the city boundaries. However, they said that if the corporation could produce sufficient warrant to permit the building of the line they would consider it. The conveyance of goods, &c., to the Angram waterworks was given as the reason and permission was granted.

The next difficulty was as to which

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gauge should be utilized. The first promoters had decided on the 2-ft. 6-in. gauge, but the Bradford authorities were in favour of the standard gauge in order that goods wagons should be conveyed through to the waterworks without transferring the goods from the North Eastern vehicles to those of the Nidd Valley at Pateley Bridge. The Light Railway Commissioners then proposed the 3-ft. gauge; finally the 4 ft. 8½ in. was adopted.

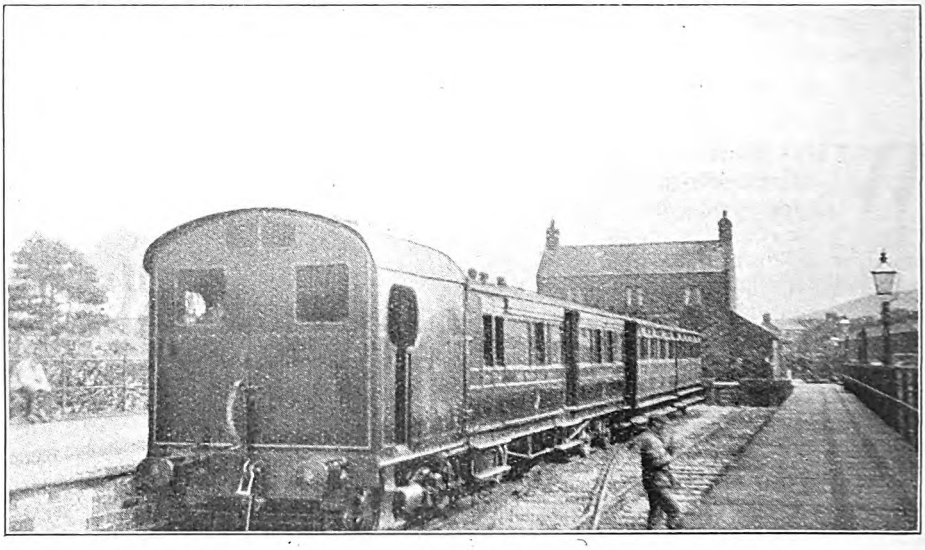
The contract for building the line was placed with John Best Limited, and on July 13, 1904, with much ceremony, the first sod was cut. Originally, the line was intended to be built from Pateley Bridge to Lofthouse-in-Nidderdale, but when it passed into the hands of the Bradford Corporation it was decided to extend the line to Angram, a total distance of 13 miles.

The completed line was opened for the use of passengers on September 9, 1907, and on this date, to celebrate the opening, a special train composed of the engine *Holdsworth*, the corporation saloon car and three coaches ran from Pateley Bridge to Lofthouse, driven by the then Lord Mayor of Bradford. At Lofthouse the engine was changed for a contractor's locomotive, and the train continued its way to Angram.

As regards the present day passenger working, the traffic is worked by a steam rail-coach, the passenger portion of which has already served as a saloon on the Great Western Railway. Ordinary coaching stock is coupled to the rail motor as required. The coaching stock includes 12 four-wheelers obtained from the late Maryport & Carlisle Railway, together with two Metropolitan coaches. In addition, there is a private saloon and eight goods vehicles.

The engine part of the steam coach was built by Kerr Stuart (works No. 906). It arrived on the Nidd Valley Light Railway during July, 1921. Working on the railway are two ex-Metropolitan 4-4-0T locomotives.

There are three classes of passenger vehicles, namely first, third and workmen's. The first-class carriages are extremely comfortable and, in fact, are quite as good, if not better, than many suburban firsts. Accommodation is given for six people, each one having the usual arm rests. Lighting is electric. The third-class coaches and those used for workmen are, however, very ordinary in character. Many of these carriages still bear notices



NIDD VALLEY LIGHT RAILWAY TRAIN AT PATELEY BRIDGE.

Kerr Stuart Rail Motor Engine with Coach, and two Ex-Metropolitan Railway Vehicles attached.

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issued by the Maryport & Carlisle Railway.

On the line of route there are four stations. Each is provided with a booking office, the usual waiting rooms, store rooms, and a station master's house. The Pateley Bridge station of the Nidd Valley Light Railway has sidings on either side of the platform. One siding gives access to the London & North Eastern Railway between Harrogate and Pateley Bridge. Ramsgill and Wath-in-Nidderdale are the two intermediate stations, and both are very picturesque. The final station and terminus, as far as passengers are concerned, is Lofthouse. There are sidings on which passenger vehicles and vans may be stored during the day-time. The fares between Pateley Bridge and Lofthouse were 1s. first-class and 6d. third, when first opened, but third-class fares from Pateley are now 2½d. to Wath, 6d. to Ramsgill and 9d. to Lofthouse.

The line is single throughout, although a number of crossing places are provided. The trains are controlled by the electric tablet system. As far as signalling is concerned there is only one signal-box on the whole railway. This is situated outside Pateley Bridge (N.V.L.R.) station, and controls the passenger line to and from Pateley Bridge platform, the lines to the London & North Eastern Railway and the station sidings at Pateley Bridge. Signalling apparatus is also provided on the station platforms at Wath, Ramsgill and Lofthouse. At Wath and Ramsgill the only lines controlled are the up and down passenger line, and a small station track. The Lofthouse signalling apparatus controls the down passenger line, the Angram extension and the station sidings. The platform signalling system is in the hands of the station staff. It also controls the various points in connection with the signals as is usual.

There are five booked trains in each direction running on week-days only. On the up journey—that is, from Pateley Bridge to Lofthouse—the trains are allowed five minutes to Wath station, from thence to Ramsgill 13 minutes, and from Ramsgill to Lofthouse each train is given five minutes. In the opposite direction the line is more favourable, although the speed limit in each direction is 10 m.p.h. The time allowance from Lofthouse to Ramsgill is five minutes, as on the up journey. Ten minutes is allowed between Ramsgill and Wath, while five minutes is given from Wath to Pateley Bridge. For the benefit of the travelling public the Nidd Valley Light Railway's time-table is incorporated in those of the London and North Eastern Railway.

In addition, special trains are run for the benefit of the workmen between Scar Village and Lofthouse. These trains run as follow :—

		Tues.	Thurs.	Sat.
Scar Village	.. dept.	8.30	8.30	1.40
Lofthouse ..	.. arr.	9.30	9.30	2.20
,, ..	.. dept.	1.30	5.0	4.45
Scar Village	.. arr.	2.30	5.40	5.25

Besides the above booked passenger trains, a number of goods trains pass over the system. One regular goods train, coming from the London and North Eastern Railway, travels the whole of the 13 miles to Angram taking provisions, &c., to the people engaged on the waterworks. The train is generally composed of a minimum of five vans. It is taken as far as Pateley Bridge by a London and North Eastern locomotive, and from thence to Lofthouse by the Nidd Valley Railway. At Lofthouse it remains until the afternoon; meanwhile one of the waterworks 0-6-0T locomotives comes down to Lofthouse and hauls the train to Angram.

The Lofthouse-Angram section of the Nidd Valley Light Railway is probably one of the most interesting railway routes in the British Isles. With regard to curves and gradients alone one would have to go a long way to find one to equal it. From Lofthouse to Angram the line is continued along the roadside without any wall or fence between the permanent way and the public road. There are no mileposts or gradient indicators past Lofthouse.

A few yards past Lofthouse station the track turns through (roughly) an angle of 60 deg., while on more than one point en route one may see the tail lamp of the rear of one's train. On this section is situated the only tunnel on the line. This had to be built through

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some particularly stony and hilly ground. The tunnel is of reduced dimensions. There is, as a matter of fact, a line by means of which the tunnel may be avoided. On the writer's visit to this railway on the up journey the train passed through the tunnel, but on the down journey the train avoided it. On the same section is a coaling station and water tanks at which trains generally stop.

The scenic beauty of the district is of the highest class. The river Nidd has formed one of the celebrated Yorkshire dales which accounts for the prevailing dalelike and wild scenery. Pateley Bridge is the centre of Nidderdale, and is well supplied with woods, caverns, waterfalls and other natural objects of interest. On this section—that is, the Pateley Bridge-Lofthouse section—is situated the Gouthwaite Compensation Reservoir, an interesting feature of which is the castellated masonry.

At Wath the station is situated such that on one side is the Gouthwaite Reservoir and on the other the steep sides of the valley. Ramsgill, the birthplace of Eugene Aram, is the chief village in Stonebeck Down, and from here to Lofthouse the valley is seen to be closing in as the river becomes narrower.

Past Lofthouse the hitherto hilly regions are displaced by bare moorlands and undulating pasture lands. This type of scenery dominates until the train reaches the waterworks, where lines branch from the main track and run down to the works.

The locomotives used in connection with the waterworks are of the 0-4-0T and 0-6-0T types, and are mostly on hire. Some are of the very latest designs having been built quite recently, but others have spent the greater part of their existence on various railways.

At Angram the railway company has built locomotive and carriage sheds in which the works locomotives are shedded. Workshops and offices in connection with the railway have been erected, together with coal stages and weighing machines.

Before concluding the writer would like to express his thanks to the officials of the waterworks department of the Bradford Town Hall for information received in connection with this article.

A SWISS RAILWAY STATION IN A PICTURESQUE SETTING.

AROSA STATION, CHUR-AROSA RAILWAY.

(*See* THE RAILWAY MAGAZINE, *dated April*, 1926.)

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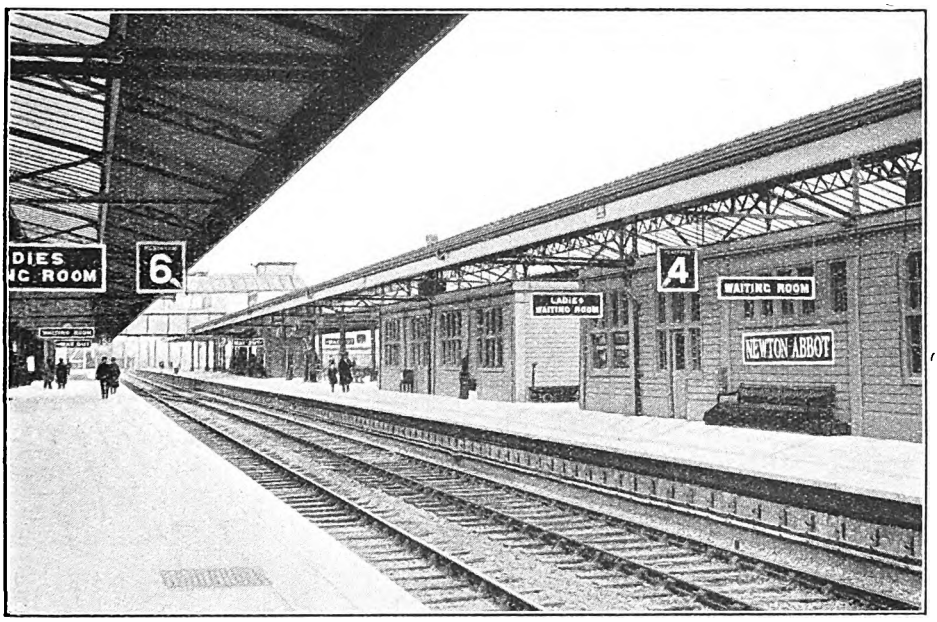

Photo.] NOS. 4 AND 6 PLATFORMS IN NEW STATION. [*Topical.*

New Station at Newton Abbot, Great Western Railway.

ON Monday, April 11, the new station which has been constructed by the Great Western Railway at Newton Abbot, was formally opened by Lord Mildmay of Flete, who also presided at a luncheon, among those present being Viscount Churchill (Chairman) and other Directors of the Great Western Railway, Sir Felix J. C. Pole, General Manager, and other officers, and representatives of public bodies and the trading community in the district.

The old station, which has been demolished, was one of the few remaining structures of the South Devon Railway Company, and, except for minor improvements, had remained practically unaltered since it was built in 1846 from the plans, and under the supervision, of Brunel. Interesting reminders of these bygone days are the wrought-iron scrolls, inscribed "S.D.R.," which had to be removed from above the old exits. These are being preserved, one over the ticket windows in the main booking hall of the new station, one in the Newton Abbot Museum, and the other among the historic relics at Paddington.

Work on the new station was commenced in November, 1924. An imposing, three-storey, block of buildings has been erected on the main Newton Abbot-Torquay road, facing the town park. The structure is of Portland stone and red Somerset bricks. A conspicuous feature of a pleasing façade is a handsome clock, placed in the centre pediment, the gift of the townspeople of Newton Abbot.

The three small platforms which formerly served the station have been replaced by two wide island platforms, each having a length of 1,375 ft., of which 570 ft. is veranda covered. A separate bay platform of 320 ft. has been provided to meet the increasing traffic over the Moretonhampstead branch. Alterations have also been made in regard to the running lines, so that there are now six running lines (through, main and relief) with scissors crossings intermediately along

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the platforms. Four lines, arranged on the parallel system, have been provided as far as Aller Junction.

Two new manual signal-boxes have been constructed at the east and west ends of the station, in place of the three

ing rooms and attractive bookstalls. The station is lighted by electricity, and all the buildings are centrally heated. On the first floor is a dining and tea room, 66 ft. by 19 ft. This room will be available for social functions, and has a

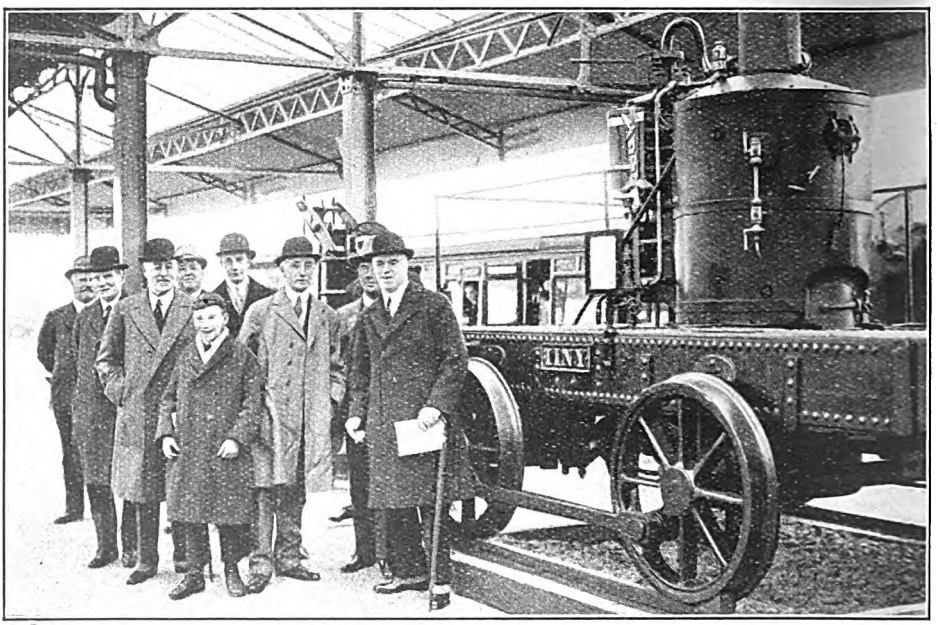


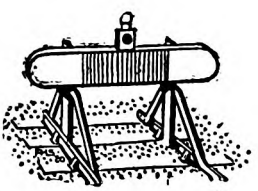
Photo.] OLD BROAD GAUGE LOCOMOTIVE "TINY" ON EXHIBITION. [*Topical.*

Group includes Viscount Churchill (Chairman), Sir Ernest Palmer (Deputy Chairman), Lord Mildmay of Flete (Director), Mr. H. L. Younger (Director), Sir Felix J. C. Pole (General Manager), Mr. J. C. Lloyd (Chief Engineer), and Mr. E. Ford (Chief Goods Manager).

previously existing, and it is of interest to note that one of them contains 206 levers, and is, therefore, the second largest manual box on the system.

Refreshment rooms are available on each platform, also centrally-placed wait-

separate entrance with staircase, which gives direct access to and from the street. There is a new telegraph office, and improved accommodation has been provided for the station master, inspectors, and other staff.



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STATION LOOKING WEST FROM DOWN PLATFORM, CHICHESTER.

Chichester as a Railway Centre.

By F. L. HARRIS.

THE City of Chichester, the capital of West Sussex, with its population of twelve thousand odd, and its locally important weekly market, is on the main Portsmouth line of the old "Brighton" railway, and had in pre-Southern days an excellent train service to London, being a stopping place for the L.B. & S.C. Portsmouth expresses. Nowadays, with the concentration of the Portsmouth services upon Waterloo, Chichester is not now quite so well served, but it still has quite a good train service in view of its traffic importance.

Not only has Chichester the traffic which is to be expected from a market town and junction, but it is also the station for the village of Selsey, which of late years has made great strides as a residential district and holiday resort. Quite a number of business people live at Selsey and go up to town by motoring into Chichester, and taking train from there. In addition to this, there is, in the season, a considerable holiday traffic to Selsey and the smaller resorts of Bracklesham Bay and East and West Wittering, at which places many bungalows have sprung up. When the holiday makers are returning home, Chichester station presents a very animated sight, with its courtyard crowded with carriers' vehicles, private cars and last, but not least, the ubiquitous Ford taxicabs which ply in the district, while the up platform is packed with trunks and bicycles and the sunburnt homeward throng which own them.

The railway activities centring on the city are, however, by no means confined to holiday traffic. A considerable amount of through and local traffic is dealt with, not the least of this being the traffic from the Midhurst branch, which serves not only that ancient town, but also the villages of Lavant, Singleton, and Cocking, as well as providing an alternative route to Horsham and London. There are seven trains from Chichester to Midhurst and five in the reverse direction. Some of these trains serve Pulborough and Horsham, beyond Midhurst, with the intervening stations. The old-established grammar school at Midhurst claims a large number of Chichester boys, and as a result the early morning train is very

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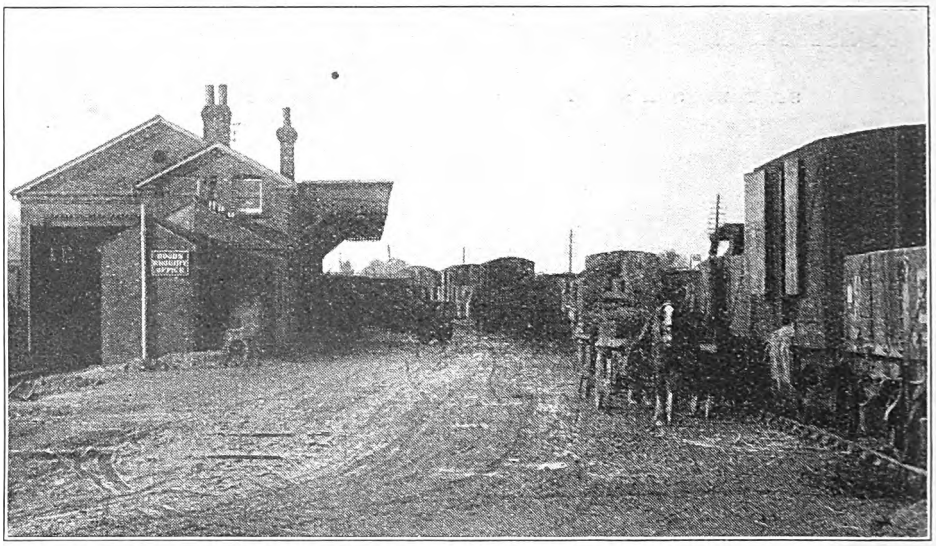
lively. It is of interest to note that this line is very severely graded, one gradient in the vicinity of Cocking being as severe as 1 in 60. The trains are chiefly motors, composed of a Stroudley 0-4-2T locomotive and two bogie coaches, the end one of which contains a driver's compartment (the usual "Brighton" motor train), although the writer has seen the coaches of a motor train (in "Brighton" brown) with a van (in Southern green) next the engine, hauled by a 0-6-2T. Some of the trains between Midhurst and Chichester attain quite high speeds.

Of more importance than the Midhurst branch trains are the trains between Brighton and Portsmouth, which make Chichester a stopping place. There are about eight of these each way daily on weekdays and four each way on Sundays. Through trains are also run, providing a service between Brighton and Southampton, Bournemouth and Plymouth, and also to Cardiff in conjunction with the G.W.R. As well as serving the Sussex coast and connecting East and West Sussex via Brighton, some of these trains connect with London-Bognor and London-Littlehampton trains at Barnham and Ford Junctions, thus augmenting Chichester's train service to London. The rolling-stock is, for the greater part, composed of South Western section coaches, the green-painted predominating, although a good number of the orange and black are seen. The locomotives are of the "Brighton" section. Motor trains of the usual "Brighton" type ply between Chichester and Portsmouth, serving the halts of Fishbourne, Nutbourne, Southbourne, Warblington and Bedhampton, as well as the stations of Bosham, Emsworth, Havant and Fratton, at which the Portsmouth-Brighton trains call. Cheap day fares are obtainable for use on certain trains from Chichester to Portsmouth, and are very convenient for those inhabitants of the district who wish to do their shopping in Portsmouth.



VIEW OF PORTION OF YARD SHOWING GOODS SHED, CHICHESTER.

The direct service between the City and London, provides during the summer months ten passenger up trains on which changing is unnecessary. One of the best, if not the best, trains of the day is the 11.5 a.m., which is composed of about eight bogie coaches and which has been, when seen by the writer on two occasions, hauled by a Stroudley 0-4-2 tender locomotive. This train, which travels to Victoria via Three Bridges, is non-stop from Horsham.

Chichester is well served by goods as well as passenger trains. The goods yard is fairly large and particularly long. Shunting seems to be always going on there, whenever one visits the station. There is a

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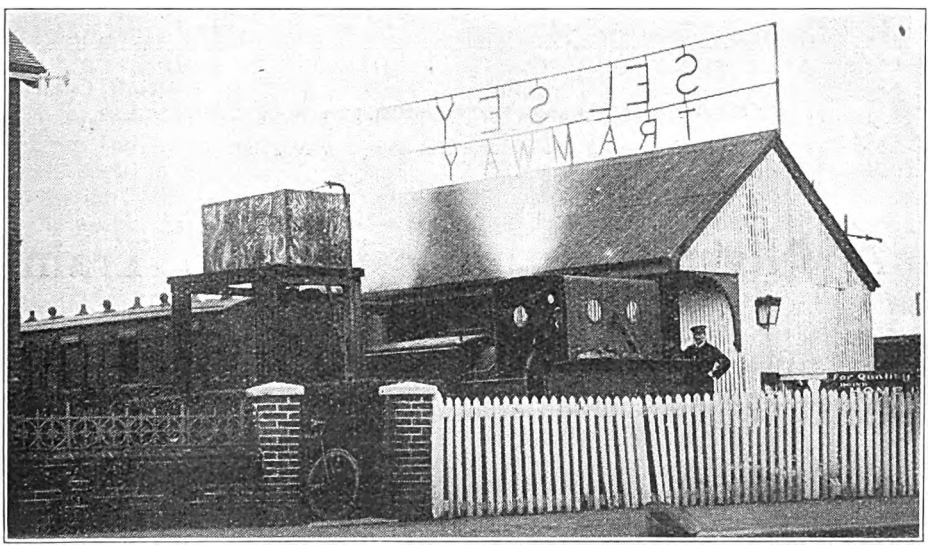
goods shed, yard with cartage road, a dock for shipping motor vehicles and there are also cattle pens. There is some interchange goods traffic with the Hundred of Manhood and Selsey Tramways, whose station adjoins that of the Southern Railway.

The Southern Railway station at Chichester is a two-platform building with two bays, both of which face towards Portsmouth. The bay on the up side is used for Midhurst traffic, and that on the down for miscellaneous trains. The station offices, waiting rooms, &c., are on the up side, which is connected to the down side by a subway, the footbridge situated at the up end now being barred to users of the station. This footbridge is solely used by foot-passengers when the crossing gates, which mark where the road from Chichester to Selsey, Bracklesham and Wittering crosses the rail, are closed. The gates are strengthened with steel wire, and are operated from a signal box. To reach the main part of the town from the station one goes up South Street. On both up and down sides of the station are courtyards, and these present busy sights upon the arrival and departure of trains, as many cars meet the trains during the holiday season. Near Drayton Station on the London side of Chichester is a gravel quarry from which the Southern Railway obtains ballast. After passing through Chichester Station, in the direction of Portsmouth the goods sidings are passed and the line continues as triple track (up and down main and the single line of the Midhurst Branch). These three continue together until Fishbourne level crossing, where the Brighton-Portsmouth road crosses the line. Immediately beyond this crossing the Midhurst line curves away to the north, and the main line continues towards Bosham as ordinary double track.

Apart from the Southern, Chichester is served by another railway, namely, the Hundred of Manhood and Selsey Tramway or as it is now sometimes called the West Sussex Tramroad. In addition to Selsey, this line, which is single throughout, serves the villages of Hunston and Sidlesham and has stations at Chalder and Ferry Siding, with a halt at Selsey Golf Links.. A peculiarity of the tramway is its " motor trains " each of which consists of two Ford ton truck chassis, with single-deck bus bodies and flanged wheels, placed with their bonnets in opposite directions, and joined by an open truck used for conveying milk churns, &c. The company's station at Chichester adjoins that of the Southern Railway, and consists of a single platform with a corrugated-iron shed which serves as a waiting room.



TRAIN IN SELSEY TRAMWAY STATION, CHICHESTER.

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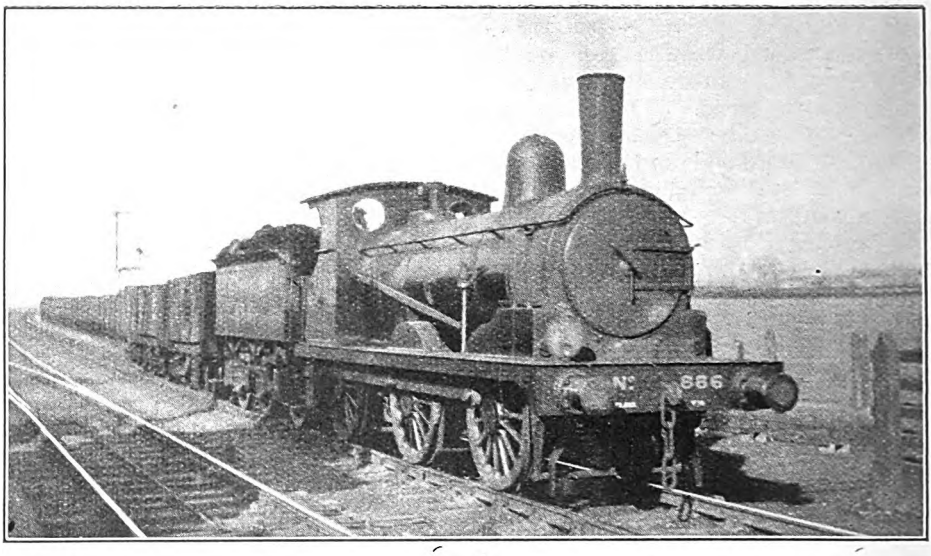

Photo.] [*G. H. Cannon.*

UP GOODS TRAIN PASSING TRUMPINGTON BOX, CAMBRIDGE.

G.E. 0-6-0 Locomotive No. 886 (now No. 7886.)

A Night-Ride on a Produce Train.

By NORMAN FROST.

THAT stretch of fertile fenland from the borders of Lincoln to the spire of Ely, yields enormous quantities of vegetables each season. Soon after noon these fen villages stir with the bustle of drays, lorries and tumbrils on their way to the station sidings, where carrots, potatoes, celery and cabbages are loaded into wagons by the ton. Here the railway company takes charge; sheeted and loaded wagons consigned to the various markets are shunted out and rushed away to a large marshalling yard at a convenient junction.

Big trains and little trains follow one another into the reception roads at this distributing centre, and there await their turn for a brief period of shunting to a bewildering accompaniment of hissing steam from the various engines. Above all the tumult, the raucous shouts of shunters and the shrieks of whistles give one the impression that here indeed pandemonium has been let loose. And all this because Mrs. Smith of Bethnal Green expects her threepennyworth of brussel-sprouts and two pounds of potatoes in the morning.

I felt somewhat bucked to think that I was going to do my bit to see that she got them, although waiting about in a siding on a fast goods engine with a north-east wind blowing is likely to dampen the ardour of the most enthusiastic of men, trying to find consolation in the fact that, after all, he was doing something to help make the world go round.

When the tumult and the shouting died down, an authoritative voice delivering the order, "Back On" and "Right Away," shattered my thoughts of the warmth and comfort of an empty feather bed within my knowledge. Being the fireman on this particular market train, I quickly found a more energetic task than dreaming of feather beds, or cabbages and kings.

"Right Away to Stratford Market," called the guard, and soon the spluttering and hissing of our engine developed into the rhythmic beat so pleasing to the ear of an engineman. Bright green lights seemed to ornament the lonely wayside

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stations, bringing a feeling of speed and complacent satisfaction to me as the creator of a tremendous power, as one by one they were overtaken and then left far behind.

Chasing along through the darkness, the "clickedy-click, "clickedy-click" of the rail joints seemed to give way to "potatoes and greens," "potatoes and greens," with an annoying insistence until the passing of the junctions at Ely called for a more watchful alertness on my part.

I took in the shadowy form of the cathedral, a lonely sentinel of this fenland night, dark as only the fens can be. Then we were in the open country once more, the darkness again intensified by the shaft of brilliant light which seemed to pierce the sky whenever I opened the fire-hole door, until the lights of Cambridge came into view, signalling a brief respite from my labours. At a reduced speed we stole stealthily, I thought, through the university town, lest we might waken the seekers after knowledge from their beds.

A series of green lights came into view as we rounded the bend, telling us once more of the open road and incidentally of the "open door," as ready as ever to be fed. Onward through the cuttings and tunnels of the Gog and Magog Hills, uphill and down, until we reached the level of the Lea valley.

Soon a faint light in the night sky reminded me how near we were to London, if the rattle of the train through the suburban stations were not sufficient advice. The faint smell of sulphur which had pervaded my nostrils all night had to give way to the various odours, mostly unpleasant, some decidedly obnoxious, which seem to be part and parcel of London's environs.

With a sharp lurch to the left we took the iron road to Stratford Market, and there we finally came to rest in the sidings. as the first faint streaks of dawn appeared. All seemed strangely quiet here after the heat and burden of the night, with its rattlings and bumpings which had tired my bones, and I fell to thinking of feather beds again. New interest was soon awakened by the arrival of salesmen, and costers, complete with donkey barrows at the sheds where the produce is unloaded and sold.

The newly-purchased vegetables were then taken to their depôts by the wholesalers, and by the costers to the street markets and into the courts and alleys of Bethnal Green and Bow, where Mrs. Smith, I suppose protests about the price of everything in general and cabbages in particular.

Having disposed of our train, we took the engine to the "Loco" depôt to be turned and stabled in readiness for our journey home. Then to the hostel or dormitory, all thoughts of London's food giving place to a more lively interest in my own. Hungry and tired, I reported my particulars to the attendant who informed me that my number would be "37," and number 37 never once deserted me until I left for duty after nine hours' rest. Number 37 peg waited to receive my overalls, &c., and 37 locker my food box and other personal belongings.

After a most welcome bath I felt ready for the meal admirably cooked by the ever faithful "Alf." Despite an intense longing for sleep, I could not resist the impulse to enjoy a few minutes by the cheerful reading-room fire. Thanks to the kindness of some charitably disposed officials, the library offers almost anything from "Uncle Tom's Cabin" to Bernard Shaw.

After half an hour with Barrie's "My Lady Nicotine" I found my way to bedroom No. 37 with its L.N.E.R. stamped sheets and pillows .

The Bible, which is part of the furniture, I opened at random, only to be reminded even within its sacred pages of my noisily sleeping friend the driver in the next room, for did it not read—"This is Jehu, son of Nimshi, for he driveth furiously."

But forgetfulness comes with sleep, even if it is taken in railway company's linen during the hours of daylight, when London eats the cabbages we bring.

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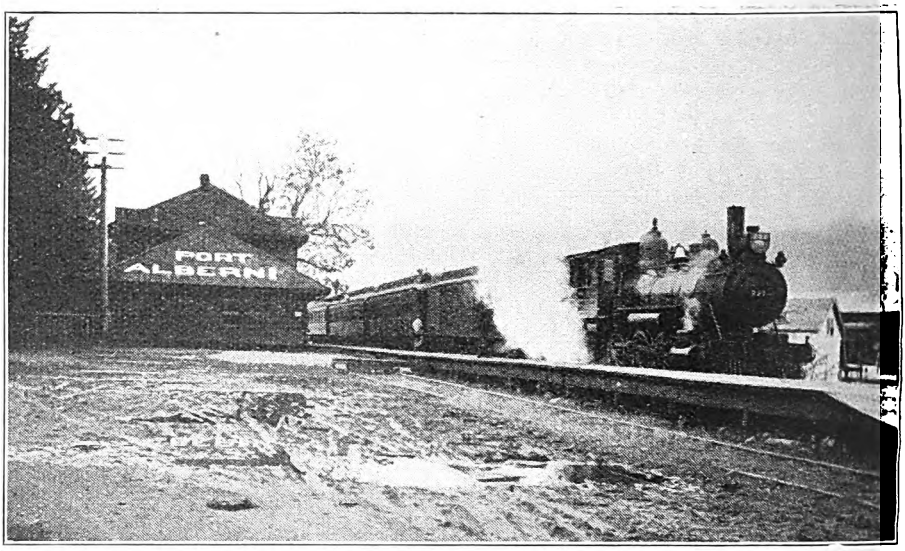

Photo.] MORNING TRAIN LEAVING PORT ALBERNI. [*C. E. Alford.*

The Esquimalt and Nanaimo Railway.

THE MOST WESTERLY RAILWAY IN THE EMPIRE.

By C. E. ALFORD.

VANCOUVER Island is so often confused with the city of the same name that it may be as well if I point out that, whilst the city is situated on the mainland of British Columbia, the island lies in the Pacific Ocean, some 25 miles to the westward. In area it is about one-third the size of England and Wales, being roughly 280 miles long and 80 miles broad at its greatest width. The Northern and Central regions are practically uninhabited, and there are neither roads nor railways, the more important townships being found on the Eastern side of the Island, within a radius of 150 miles of Victoria (population 60,000), the capital of the province. The second largest town is Nanaimo (population 9,000), 77 miles from Victoria, the third in importance being Port Alberni, on the west coast, whilst other centres of population are Duncan, Ladysmith, Wellington, Parksville, and Courtenay.

These towns are linked up with Victoria by the Esquimalt and Nanaimo Railway, remarkable not only for the grandeur of the country it traverses, but as a triumph of engineering only equalled, perhaps, by the passage of the Rockies. For the Island is really one vast chain of densely wooded mountains, the timber of the Alberni district being the biggest in the world, many of the trees attaining a height of 300 ft., and measuring from 30–40 ft. in circumference. In view of the mountainous nature of the country, one would at least expect the grades to be severe; yet, strangely enough, there is not a single stiff gradient on the whole line.

The railway was opened on August 13, 1886 just six weeks after its big brother, the Canadian Pacific. Apart from the necessary crossings, the line is single-tracked throughout, its total length from Victoria to Courtenay being slightly under 140 miles, whilst at Parksville (95 miles) it branches south-west for 40 miles to Port Alberni. There is also a short branch to Cowichan Lake.

Two passenger trains run daily each way

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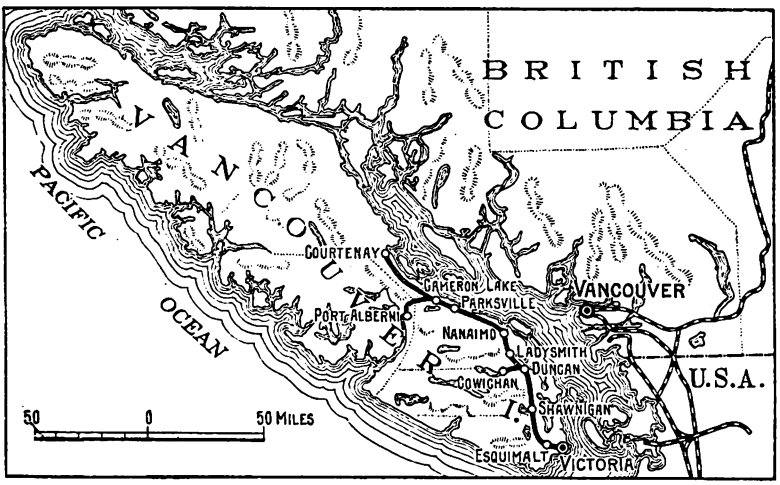

between Victoria and Wellington, thence once daily, except Sundays, to Courtenay. Between Parksville and Port Alberni a thrice-weekly service is maintained.

The 140 miles between Victoria and Courtenay is accomplished in exactly 6 hours 35 min. on the up journey and 7 hours on the down; the 38 miles between Parksville and Port Alberni in 1 hour 55 min. on the up journey, and 1 hour 55 mins. on the down—hardly express speeds, as we reckon them in the old land; but then, the conditions are so entirely different, and it must also be remembered that in addition to the 17 scheduled stops, the trains will also stop on signal at all the other stations. Such factors make all the difference.

The line is operated by the Canadian Pacific Company, and the locomotives used are the ordinary type for drawing fairly light passenger trains, the fuel consisting solely of oil. A parlour car, with observation platform, is attached to the rear of each train, the remaining coaches being the usual "standards" in use on the C.P.R.

To cope with the heavy volume of tourist traffic during the summer, two hotels have been erected—one at Shawnigan, near Duncan, the other at Cameron Lake on the Port Alberni branch—the latter being one of the beauty-spots of the Island, where visitors can enjoy the luxuries of civilisation amid some of the wildest and most romantic scenery in the world. Newspapers and supplies arrive by the morning train from Victoria, and as both

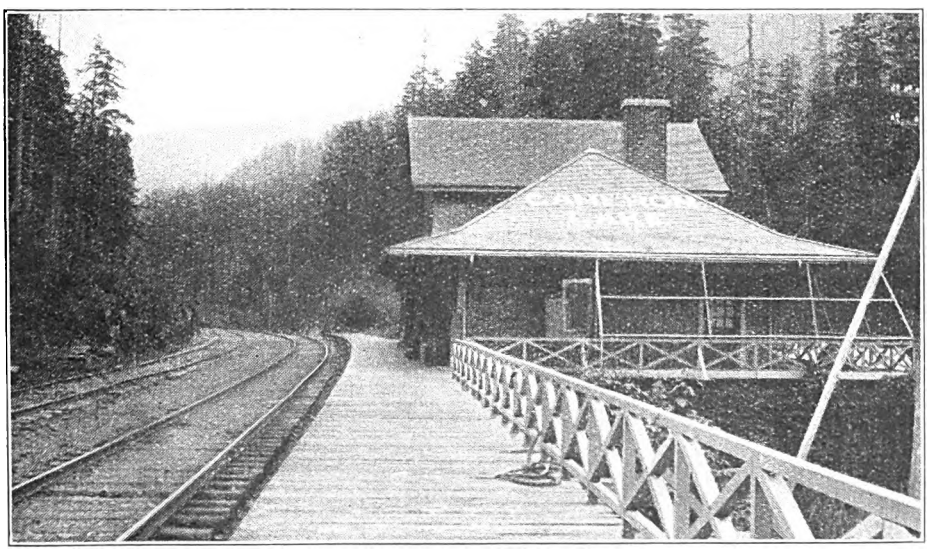

Photo.] CAMERON LAKE STATION AND CHALET. [*C. E. Alford.*

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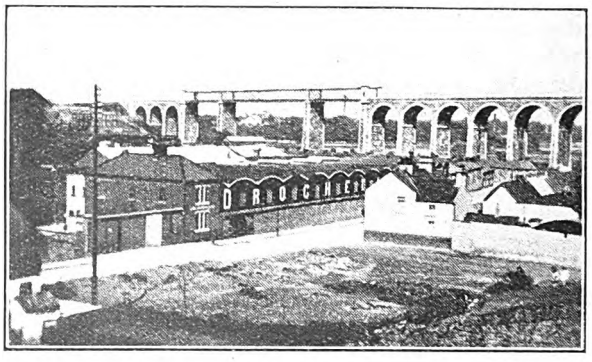
hotels are adjacent to the station platforms, the provisioning problem is reduced to a minimum. The Inn at Cameron Lake, built, appropriately enough, after the style of a Swiss Chalet, serves as a base for those who wish to climb Mount Arrowsmith.

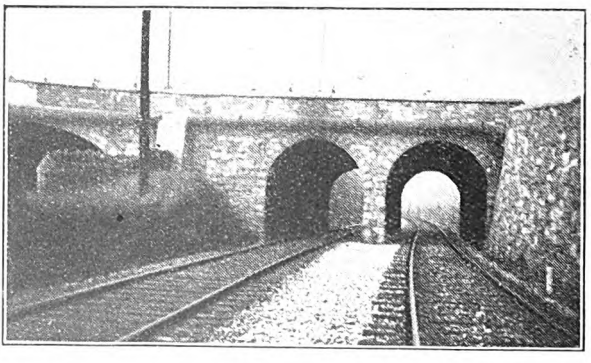
I cannot close this article without a reference to that fine old township from which the railway takes its first name. In the early days of the line, Esquimalt was the base of our Pacific Fleet, and as such was of even greater importance than Victoria. In 1905, however, the Dominion Government took it over, and with the dismantling of the Navy Yard its glory faded. Though the town is now but a ghost of its former self, the Company still retains the name, and long may it continue to do so.

SOME IRISH RAILWAY SCENES.

(Photographs by R. D. Gauld.)



BOYNE VIADUCT, DROGHEDA, G.N.R. (I).



NORTH WALL BRANCH, M.G.W. SECTION, G.S. RAILWAYS.

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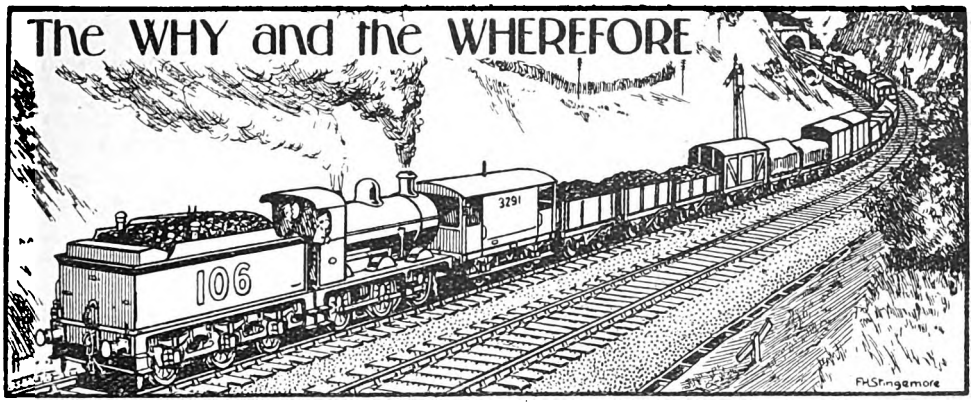

RAILWAY MAGAZINE readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o RAILWAY MAGAZINE, 33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The thirtieth Annual Edition (1927) of this standard railway reference work is now published. All previous Editions are out of print.

West London and West London Extension Railways.

From Willesden Junction to Addison Road is the West London Railway, jointly owned by the L.M.S. and G.W. Companies. From Addison Road to Clapham Junction, &c., is the West London Extension Railway, of which the Southern Railway is part owner with the G.W. and L.M.S. Railways. Metropolitan trains work from Uxbridge Road to Addison Road on the basis of a Hammersmith and City Railway through working arrangement, the G.W. Company being a part owner also of the Hammersmith and City line. Except for a connection with the Ealing and Shepherd's Bush Railway, in which again the G.W.R. is interested, there is no connection with the "Underground" system on that side of Addison Road. The connection from Addison Road to the Metropolitan District Railway is L.M.S. property, this explaining why their electric trains work to Earl's Court, while powers are still in force, though not exercised, for working trains through to Mansion House. The Clapham Junction-Addison Road route has not yet been included in the Southern Railway electrification scheme, and equipment would have to be a matter of arrangement with the other companies concerned, as in the case of the conductor-rails laid through Uxbridge Road to Addison Road and from Willesden Junction. The railway arrangements, as a whole, in this area are very complicated. See article by the late Rev. W. J. Scott in the April and May, 1920, issues of THE RAILWAY MAGAZINE. These numbers are, however, now out of print.

[Reply to "SOULECTRIC."]

Railway Maps.

If the group railway maps published by Philips, Bartholomew and others are on too small a scale to meet your requirements, your only course is to purchase such maps as you need from the Railway Clearing House. The series includes large folded maps of England and Wales, Scotland, and Ireland, together with sectional maps dealing with London, certain busy areas, and on a county basis. The various ownerships are indicated in distinctive colours, and distances between junctions and other information are included, as the maps have been prepared with a view to official use. These are necessarily somewhat expensive, though they are sold in several forms. Particulars of prices, &c., can be obtained from the Railway Clearing House. So far, preliminary steps only have been taken in

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regard to the construction of the new Metropolitan line from Edgware Road northwards.

[Reply to "ARAMI."]

Exhaust of Compound Locomotives.

If a compound locomotive starts from rest working either full compound or even semi-compound the exhaust is bound to be soft in character, and is sometimes barely audible, as you may notice at any time, for example, with the French compounds of the G.W.R., and this doubtless explains the quietness of the exhaust of the P.L.M. 4-cylinder compounds leaving the Gare de Lyon at Paris, to which you refer. The Deeley regulator of the Midland compounds of the L.M.S. allows these engines to be started as simples, using high pressure steam in the two low-pressure cylinders, and their exhaust on starting is therefore normal until compound working is begun.

[Reply to R. M. TUFNELL.]

Locomotive Chimneys and Main Frames.

Chimneys made from slightly different patterns and of varying thicknesses are sometimes found on various engines of the same class. This may be due to the utilisation of material cast some time ago, or to an attempt to arrive at the best proportioned chimney to facilitate efficient steaming. Presumably, in the case to which you refer, experimental chimneys are being tried. By curving the main frames of some of the L.M.S.R., L. & Y., 4-6-0 tender engines and the 4-6-4 Baltic tanks in the manner you describe, a hole can be drilled through each frame, into which the hooks of the chains for lifting the engine at the front end are placed.

[Reply to EDWIN W. CARTER.]

Locomotives of Unusual Types.

The one 0-8-0 tank locomotive owned by the Great Central section of the L.N.E.R. belonged originally to the Wrexham, Mold and Connah's Quay Railway, a small system in North Wales, which was taken over by the G.C.R. some time before the grouping. We have no information in regard to your other query; if the lettering had been "C. & W.Jc.R.," the ownership would have been Cleator and Workington Junction Railway, in West Cumberland, but we are not acquainted with any "C. & P.J.R." or "G. & P.J.R.," unless possibly there were any locomotives owned independently by the Glasgow and Paisley Joint Railway at any time.

[Reply to "ST. ANDREW."]

Ljungström Turbine Locomotive.

This engine is the property of the makers, though it has run trials on the L.M.S.R. by arrangement with that company. We have no information as to its future service. There are a number of favourable gradients on the Midland route between Manchester and London where speeds substantially over 80 m.p.h. are regularly attained. There have been occasions when speeds approaching or even reaching 90 m.p.h. have been attained on the Midland line.

[Reply to R. M. FREARSON.]

Working of 4-6-0 Engines, L.M.S.R.

It is difficult to say what are the "regulator and cut-off positions used generally in working the "Claughton" and "Cardean" type 4-6-0 engines, as these are bound to vary greatly, according to load and the whims of individual drivers. You may take it in both cases, however, that a partly-closed regulator and fairly long cut-offs are the rule, rather than the Great Western practice of full regulator and short cut-offs.

[Reply to E. JOSLIN.]

Pre-war Schedules, Northern Railway of France.

At no time before the war was there any faster booked run over the Paris-Calais main line of the Nord Railway than 3¼ hours. One of the *trains-de-luxe* did the 184-mile journey in this total time, inclusive of a stop at Amiens, and was booked to cover the 81½ miles from Paris to Amiens in 82 min. But the trains of those days were of considerably lighter weight than the fastest trains now operating.

[Reply to M. C.]

Adams 0-4-2 Locomotives, L.S.W. Section, S.R.

We have no precise information as to the provision of a lamp bracket on the side of the tenders of Adams 0-4-2 engines

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of the late L.S.W.R., adjacent to the footplate, and so arranged that the lamp would throw a beam of light at right-angles to the track instead of forwards or backwards, but we think it probable that the arrangement was intended to facilitate the exchange of tablets after dark on single-line sections.

[Reply to NORMAN NEWTON.]

Slip Coaches for Bristol, G.W.R.

Slip coaches for Bristol on the South Wales expresses leaving Paddington at 8.55 a.m. and 7.55 p.m. are detached at Stoke Gifford East Junction, between Winterbourne and Patchway, near the point where the South Wales main line and the Bristol (via Badminton) line part company. The slip portions are worked by local engines from Stoke Gifford into Temple Meads.

[Reply to C. E. T. J.]

Maximum Speeds on Western Division, L.M.S.

Records were obtained by the late Mr. C. Rous-Marten, of speeds slightly in excess of 90 m.p.h., in the descent of Shap incline in both directions ; and Mr. Cecil J. Allen has recorded in his articles a maximum of 90 m.p.h. in the southbound descent of Shap. Beyond this, however, we have no authentic record of " the highest speed ever attained " on the late L.N.W.R.

[Reply to G. D. PAGE.]

L.N.E.R. Locomotives.

We have no information as to whether a change in the colour scheme for locomotives is intended, but note your remarks that 0-6-0 tank engine No. 1679, working at York, is painted green, and not the black usual for tank engines. The L.N.E.R. locomotive classification will receive further attention in due course.

[Reply to P. R. HARGREAVES.]

Standard L.M.S. 0-6-0 Goods Engines.

We do not know to what you refer by the apparatus resembling a " motor-car exhaust pipe and silencer " on the side of the latest standard L.M.S. freight engines of the Midland type, unless it be the injector, which is mounted on the side of the boiler, at the centre-line, just behind the smokebox.

[Reply to " MIDLAND COMPOUND."]

Speeds down Beattock Bank.

Higher maximum speeds down Beattock bank, but a longer overall time from Summit down to Beattock are easily explained by the fact that, on such a run, the driver reduced his speed over various curves to a greater degree than on a run with a shorter overall time, but lower maxima.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

G.W.R. Locomotive Matters.

While it may be exceptional for a 4-6-0 locomotive to work on the Chester-Birkenhead section, these engines do so occasionally. For instance, locomotives of the two-cylinder 4-6-0 class worked Great Western " Grand National Specials " from Shrewsbury to Birkenhead.

[Reply to G. W. LACEY.]

L.N.E.R. Engines at Oxford.

We note that you have seen " Atlantic " No. 4428, of the G.N. type, on the 3.40 p.m. Sunday train from Oxford to Nottingham and Sheffield. You are mistaken, however, in your assumption that this train comes from Paddington ; it is from South Wales, via Swindon.

[Reply to G. B. M. ADLAM.]

New " L " Class 4-4-0's, Eastern Section, S.R.

Your query as to a pipe running from the smokebox to the cab of these engines is not very explicit, but we imagine that you may refer to the pipe leading from the vacuum ejector on the footplate to the smokebox, through which the air from the train pipe is exhausted.

[Reply to H. A. BRADBY.]

Devizes Line, G.W.R.

4-6-0 engines are allowed to work over the old Berks and Hants route from Patney to Devizes and Holt Junction, and do so frequently on such trains as the 2.45 p.m. from Paddington to Bristol via Devizes.

[Reply to D. SEATON.]

Newton Abbot Station.

The new station which has now been brought into use includes two island platforms, each 1,375 ft. in length, with a separate bay platform, 320 ft. long, for the Moretonhampstead branch service.

[Reply to D. B. HART.]

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New L.M.S. Locomotives.

The first of the new 2-6-0 + 0-6-2 "Garratt" type engines for the L.M.S. has already been delivered, and is now in service, we believe, on the Midland Division. The new 3-cylinder L.M.S. 4-6-0 locomotives are to be simple, not compound. If you consult the rules at the head of these columns, you will see that not more than two queries from one reader are answered in any one issue.

[Reply to A. G. THORNLEY.]

Hither Green Sidings.

Mr. I. A. Bourne explains that the private locomotive noted near these sidings presumably belongs to the firm building the Downham housing estate. The siding runs towards Southend (Catford) from a point on the up side between Grove Park and Hither Green.

[Further reply to G. R. GRIGS].

"Atlantic Coast Express," Southern Railway.

Although no booked stops are shown for the 10.45 a.m. summer advance portion of this train from Waterloo, service stops are made at Salisbury and Exeter to change engines.

[Reply to "SOULECTRIC."]

Rail Bonds.

Your sketch shows a rail bond as required for track-circuiting to maintain electrical connection from one rail to the next. We have explained this several times. [Reply to R. C. R.]

Railways of Malta.

Several readers have written pointing out that short particulars of the Malta Railway were given in our issue for March, 1912.

[Further reply to "INTERESTED."]

L. & L. S. R. Gauge.

The Londonderry & Lough Swilly Railway (Ireland) is laid to a gauge of three feet, and is the longest independent line of this gauge in the Kingdom.

[Reply to G. E. FENTON.]

G.N.S. Section Main Line, L.N.E.R.

This is double-tracked from Aberdeen to Huntly only, and not to Grange Junction, as you suppose. We have no information on your other query.

[Reply to "GREAT NORTH."]

"Z" Class 3-cylinder "Atlantics," L.N.E.R.

Tractive effort of this type, at 85 per cent. working pressure, is 19,800 lb. You do not state where you noticed the misprint to which you refer.

[Reply to M. H. A. DAVISON.]

Locomotives, Names and Numbers.

Particulars of the engines mentioned by you have been given in recent issues under the heading of "Named Locomotives on the L.N.E.R."

[Reply to "LORD NELSON" and J. W. DIXON.]

Electric Train Speeds.

Electric trains on the Southern Railway are capable of speeds up to about 55 m.p.h., though, normally, 50 m.p.h. is about the limit.

[Reply to G. E. SHIPP.]

Named Locomotives, S.R.

None of the "B" section locomotives given in your list now carry names. No. 199B, *Samuel Laing*, was scrapped some time ago.

[Reply to P. BRADLEY.]

Safety Valves.

The Drummond locomotives on the late London and South Western Railway were all fitted with safety valves of "pop" type located on the dome.

[Reply to C. H. SIMMONS.]

0-4-4 Great Northern Tank Engines, L.N.E.R.

We believe that the last of the Stirling 0-4-4 tank engines of the Great Northern section of the L.N.E.R. has now been scrapped. [Reply to "BELLVARDY."]

Egyptian and Sudan Government Railways.

These railways are independent so far as rail communication is concerned, though steamer services provide a connecting link.

[Reply to F. R. P. VINTER.]

"River" Class Locomotives, S.R.

The numbers and names of these engines were included in the particulars given on page 80 of the January, 1926, number.

[Reply to E. BEAUMONT.]

Branch Line at Gillingham, S.R.

The branch line to which you refer near Gillingham, Southern Railway, serves the Chatham dockyard.

[Reply to R. H. EDGECUMBE.]

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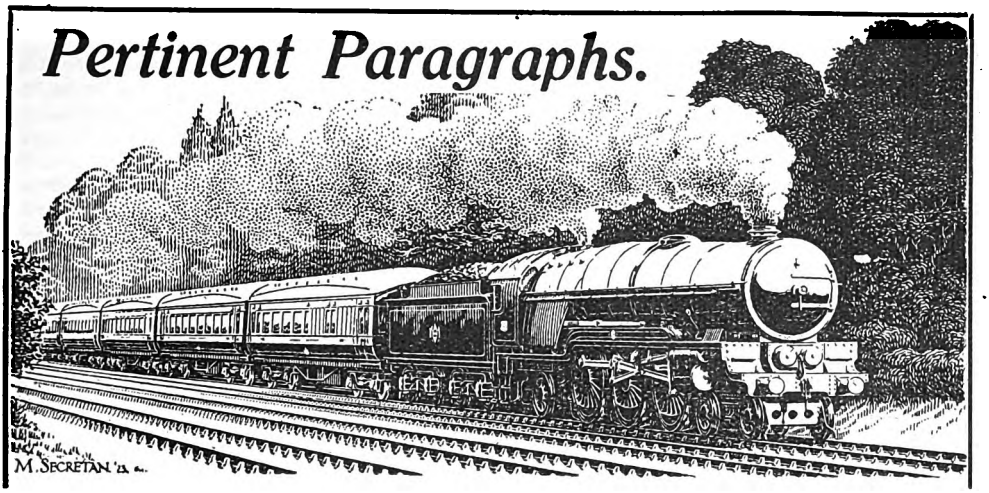
Pertinent Paragraphs.



Touring Britain by Railway.

ANTICIPATING the American tourist invasion of the British Isles this summer, the railway companies have issued a combined list of circular tours covering all places of historic or romantic interest in the country. Many of these tours comprise journeys by rail, road and steamer, and in many cases are available over more than one system. Various alternative routes in either direction are also provided. The number of tours from which selections can be made total nearly 200, with a range and interest that cannot fail to attract not only American and other overseas visitors but British tourists as well, "many of whom have still to discover the land of their birth, which offers a greater variety of scenery in a small area than any country in Europe." For the use of British holiday makers separate booklets are issued containing particulars of the tours arranged by the companies individually, including many of the tours given in the general pamphlet. As with ordinary tourist tickets, break of journey may be made either going or returning at any point *en route* and, as they are available for two months, the "go-as-you-please" character of the tours should appeal to the leisurely tourist as well as to those whose itinerary is planned to the last moment with the list of places they have to see ready for ticking off the instant they have been glimpsed. A reduction of 25 per cent. in the single fare from point to point provides a visit to all that is best in Britain at a remarkably low fare which, for the convenience of American visitors, is also stated in dollars and cents. With a few exceptions, the tours are available from May 1 to October 31.

The Ministry of Transport.

OVER seven years ago, in the autumn of 1919, following upon the passage of the Act for its creation, we recorded the birth of the Ministry of Transport. We have now to chronicle its contemplated decease, at least as a separate department of State. Many portents attended its birth, but its demise will attract comparatively little notice, especially as the work which remains will presumably continue to be carried on under the Board of Trade, from which it originated and to which it returns. Extravagant prophecies were freely made at the time of its creation as to the intentions of the Government in regard to the railways, and a reference by Mr. Churchill, who now, as Chancellor of the Exchequer, announces its impending dissolution, in a speech at Dundee, was interpreted in some quarters to mean that the Government intended taking over the railways and operating them through the Ministry. This was officially contradicted, but some colour was lent to the reports then current by the very elaborate organisation of the Ministry under Sir Eric Geddes, its first Minister, a fabric which, however, he himself did most to dismantle when Chairman of the so-called "Axe" Committee in 1921.

The primary duty of the Ministry was, in fact, to prepare, during the space of two years, for the decontrol of the railways, and to define the future policy of the State towards them in the measure which passed into the law as the Railways Act of 1921. This accomplished, its main work, apart from the Roads Department, was done, and when consequent amalgamation of the railways had been completed, there was no longer any justification for the retention of a separate Ministry to carry out functions similar in substance, if slightly enlarged in scope, to those previously performed by a department of the Board of Trade. The Roads Department, formerly the Roads Board, was by statute a separate entity, and indeed in

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recent years has been rather anomalously placed in the steadily shrinking Ministry, being in practice the tail that has wagged the dog. The Rates Tribunal and the Electricity Commission are also virtually autonomous departments, although nominally responsible to the Minister.

The time was therefore ripe for the re-absorption of the functions of the Ministry by the Board of Trade, and the announcement of the Chancellor of the Exchequer came as a surprise to nobody who was aware of the situation. On the personal side, the change is facilitated and indeed was foreshadowed by the recent appointment of Mr. J. R. Brooke, the Permanent Secretary, to the office of Secretary to the new Electricity Board, Mr. C. W. Hurcomb, who succeeds him at the Ministry, having come originally from the Board of Trade. Legislation will, of course, be required to redistribute the functions of the Ministry and of the other post-war departments now to be abolished, and presumably the result will be the formation of separate Railway and Roads Departments of the Board of Trade, but it is unlikely that any material change will be effected in the staff, methods or habitat of the present Ministry, and the only definite economy will be the saving in ministerial salaries.

The Wimbledon and Croydon Railway.

IN connection with the article by Mr. J. G. B. Sams on the Wimbledon & Croydon Railway, published in our March issue, Mr. Charles E. Lee sends the following additional notes, which he thinks may be of interest.

In the session of 1852 a bill was promoted for a railway from the L.S.W.R. at Wandsworth to the Croydon station on the main line of the L.B.S.C.R. This was some years prior to the construction of the West End of London & Crystal Palace Railway from the Brighton line to Battersea, and its extension, the Victoria Station & Pimlico Railway, thence to Victoria, and therefore one of the chief objects of the promoters was to afford a west-end terminus at Waterloo for the Brighton traffic. The scheme was objected to by both the Brighton and South Western companies, and negotiations ensued. As a result the bill was withdrawn when, before a committee of the House of Commons, in consideration of an agreement signed by the chairmen of the respective companies in which it was stipulated that the Wimbledon and Croydon syndicate should apply for powers to construct a line from the L.S.W.R at Wimbledon Station to Mitcham, and thence to a point on the Croydon & Epsom Railway near Croydon. The Wimbledon and Croydon was to receive a minimum sum of £820 per annum from the Brighton company, and £1,000 per annum, with a contingent increase of £500 per annum, from the South Western company. The agreements were submitted to the several boards and confirmed by them, that with the L.B.S.C.R. also receiving the sanction of the proprietors of that company. At the South Western meeting of February 16, 1853, however, their agreement was placed before the shareholders, who refused to ratify it.

The Wimbledon & Croydon Company's act of incorporation was obtained on July 8, 1853 (17 Vic., cap. 86) for a line in accordance with these agreements, that is, largely of local value and definitely abandoning the original design of affording a west-end terminus for the Brighton traffic, inasmuch as it was to connect only with the Epsom branch line and not with the L.B.S.C.R. main line. It was opened for traffic on October 22, 1855, and three days later was the scene of a fatal accident, in which the driver was killed, resulting from an engine leaving the rails. The contemporary issue of *Herapath's Railway and Commercial Journal* states that it was "owing to one of the sleepers getting displaced, and the engine, in consequence, ripping up the rail," and, by way of comment upon the cheap method of construction, says, "we cannot here help noticing that if the rails had been what is called 'fished,' the accident could hardly have happened."

The line was leased to the L.B.S.C.R. by act of July 21, 1856 (19 and 20 Vic., cap. 105), which also authorized the raising of £15,000 additional capital to lay down a double line of rails when required. The property was vested absolutely in the L.B.S.C.R. on January 1, 1866, at which date, therefore, its history as an independent company closes.

Test Run of "Lord Nelson" Engine, Southern Railway.

THE *Lord Nelson* locomotive underwent her final tests on Sunday, April 10, when she was set the task of hauling 16 corridor coaches of the latest Southern Railway type, with one dining car, from Waterloo to Exeter and back, a load of 521 tons, far in excess of anything ever attempted on this steeply graded route, and the heaviest corridor train that has ever left Waterloo station.

The normal "Atlantic Coast Express" consists of about 11 coaches (360 tons), and leaves Waterloo each weekday at 11 a.m., hauled by a "King Arthur" class locomotive. The run is in two stages:—

(*a*) Waterloo to Salisbury, 83¾ miles, in 95 minutes.

(*b*) Salisbury to Exeter, 88 miles, in 103 minutes. This section includes Honiton Bank, 7 miles at 1 in 100 and 1 in 80.

The return times are slightly faster.

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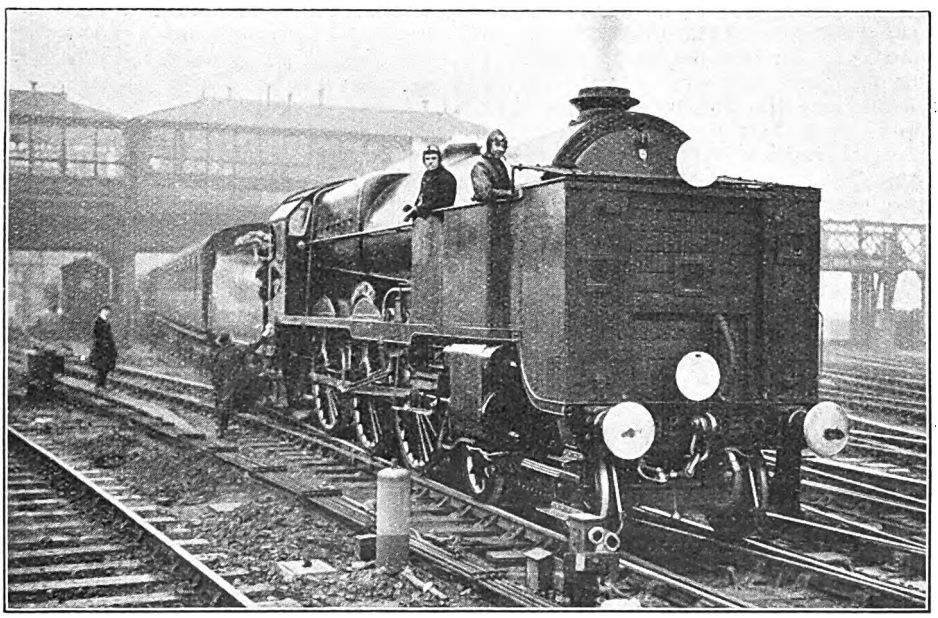
The *Lord Nelson*, with 160 tons extra, was given the normal schedule, and demonstrated its ability to perform the task. Although no special running was attempted, speeds of over 85 miles an hour normally attained by the "King Arthur" class with the lighter load were maintained without difficulty by the *Lord Nelson* with the extra 160 tons, particularly between Chard Junction and Seaton Junction in the down direction, 8 miles continuously at over 85 miles an hour. Valuable information as to the new locomotive design was obtained by officials of the Chief Mechanical Engineer's Department travelling in the special "indicator shelter" on the front of the engine throughout the day.



"LORD NELSON" LOCOMOTIVE, S.R., LEAVING WATERLOO FOR TEST RUN. ENGINE FITTED WITH INDICATOR SHELTER.

Rhayader-Llangurig-Aberystwyth Section, Manchester and Milford Railway.

REFERRING to the short article under this heading, published in the March number, Mr. R. P. Angus Lewis writes as follows:—"It may be remembered that a few years ago the G.W.R. proposed to build certain lines if they got Government assistance (which was not forthcoming). Among these lines was one from New Radnor to Trawscoed. This would, presumably, follow the same route as Mr. Perkins' line from Penybont onwards; *i.e.*, it would follow the Elan and Ystwyth valleys; presumably, it would also serve Llandrindod Wells, and make use of the Cambrian line from a little north of Newbridge to a little south of Rhayader (confluence of Elan and Wye). The nature of the route can be seen from the fact that two summits of 1,250 ft. have to be negotiated; probably that about four miles west of New Radnor would have to be tunnelled to get a reasonable gradient. Even so, it is easier than the Strata Florida-Llangurig route, as there is a solid mountain wall over 1,500 ft. high from Eisteddfa Gurig to the Elan Valley. I have never seen it stated how this was to be dealt with.

"I believe the extension of the New Radnor branch was intended when that line was built. In the article on this group of branches in THE RAILWAY MAGAZINE (about 1911, if I remember rightly), reference is made to it, and it is also stated (again I have to trust to my memory) "that the bridges, &c., were originally built for double line, which could hardly have been necessary for the line as at present existing. Milford or Fishguard was then stated to be the objective, but I prefer the claims of Aberystwyth, in view of Mr. Perkins' map.

"The line would have to depend almost entirely on tourist and excursion traffic to Llandrindod and Aberystwyth, as the country through which it passes is elsewhere almost uninhabited. A certain amount might be made from excursions to the lakes of the Birmingham Water Works; indeed,

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scenic attraction would be a strong feature of the route. It follows that the line would have to be built for reasonably fast running (real express speed would, of course, be out of the question), and 'freak' gradients and curves would have to be avoided, which, from the nature of the country, would seem to involve considerable expense in construction. The distance from London to Aberystwyth would be very little, if at all, shortened, as compared with that via Shrewsbury, though a considerable saving might be made from West of England towns and South Wales; to Llandrindod the saving would be greater from London and the Midlands, less from South Wales.

"Presumably, at least, a preliminary survey was made of the route. Can you supply any further details of proposed gradients, route, distances, principal works, &c.? I make the probable distance about 47 miles from New Radnor to Trawscoed. Doubtless, the line was to be single, with long sections; possibly the Cambrian line was to be doubled where used. The L.M.S. (double line) might be used between Penybont and Llandrindod, but being a competitor it would be unlikely."

"Free Rides" in America.

IN the February, 1927, issue of THE RAILWAY MAGAZINE a brief mention was made of the extent of the losses incurred by an Indian railway, owing to the large number of persons who had succeeded in making journeys without payment of fare. Special measures were adopted to combat this evil, and by operating a crew of ticket checkers, working under a responsible supervisor, on each passenger train, it was found possible to locate stations from which passengers had been in the habit of travelling without tickets and so introduce modifications to station layouts and booking arrangements, and as a result eliminate the evil as far as possible. In America a considerable amount of "free riding" is done, the persons concerned termed "hoboes," boarding the trains, both freight and passenger, and frequently riding in positions fraught with no inconsiderable amount of danger to themselves. The Denver and Rio Grande Western Railroad, in September, 1924, adopted a method of instructing all "hoboes" as they were detected to purchase a ticket from the point at which they boarded the train, provided sufficient money was found on them. By this means over $18,393 were secured during 1926 from 5,233 passenger and freight train "hoboes," out of a total of 28,488 apprehended in the course of the year. During 1925, 36,061 "hoboes" were taken from hiding places on the company's trains. 3,636 of these paid fares totalling $11,227 under protest. While the number of "free-riders" detected in 1926 decreased to 28,488, the number who paid their fares increased to 5,233, and as a result the revenue receipts increased to $18,393. The method of detection adopted is the employment of special agents at the principal junction points, and, as the "hobo" is taken from the train, the agent ascertains the amount of money, if any, in the delinquent's possession. If sufficient money can be produced the "hobo" is escorted to the booking office where he is requested to buy a ticket from the point at which he entrained. The ticket is then cancelled and sent to the auditor of passenger receipts. Cases occur in which "hoboes" who are proceeding to points beyond those at which they are detected, purchase tickets to these points and the tickets are then given to the purchasers. In the event of a ticket purchased to a further point on the system being returned to the company for redemption, owing to the purchaser's again having stolen a ride, then the application is questioned on checking the record kept, and the refund is declined. The Denver and Rio Grande Railroad has found by this method of checking and recording that "hoboes" are attracted to certain districts by the advertisements of scenic attractions, &c., just as ordinary fare-paying passengers are influenced, and the months of April to October inclusive are especially favoured by the "hoboes" for visiting the Rocky Mountain region served by this company.

German Railway Officials' Visit to British Railways.

IN view of the fact that last year members of the Railway Students' Association of the London School of Economics visited Germany where they received many courtesies and were enabled to make a most instructive tour of the German railways, a party from the German railways recently toured the railways of Great Britain. The party, numbering about 100, reached London on Friday, April 29, via Dover, and were received at Victoria station by delegates from the Railway Students' Association and by representatives of the home railway companies. They were conveyed to their headquarters in London, the Palace Hotel, Bloomsbury, by motor omnibuses supplied by the L.G.O.C. In the evening they were the guests of the Railway Students' Association at a social and dance given at the London School of Economics.

Next morning the party travelled in reserved coaches attached to the 9.30 a.m. train from Waterloo, on the invitation of the Southern Railway. The reserved vehicles

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were detached at Southampton West station and taken into the docks, proceeding to berth No. 44. The White Star liner *Majestic* was lying alongside, and, by the courtesy of the Local Manager, Mr. P. E. Curry, the party were afforded an opportunity of inspecting it. Later, the visitors inspected the fire station on their way to the Empress Dock. Lunch was served at Spiers & Pond's restaurant on No. 45 berth, the chair being occupied by Mr. E. Burrows, Commercial Assistant to the Docks and Marine Manager. Among representatives of the department also present were Messrs. C. T. Pelly, R. Fry, and E. Uzzell. After lunch the party inspected the cold stores of the International Cold Storage & Ice Co. Ltd., then proceeding to the Trafalgar Graving Dock and the new floating dock, the largest floating dry dock in the world. The party returned to Waterloo at 4.5 p.m., tea being served on the train. On Sunday a trip was made to Windsor, where the Castle was viewed. Following lunch at the Bridge House Hotel, Eton, the party embarked on the launch *Hampton Court* for Henley, whence they returned by rail to London.

On Monday morning the visitors went to Liverpool Street to watch the suburban traffic working there, then proceeding to Waterloo for a similar purpose. They were then taken on a "Seeing London" tour, in the course of which a call was made at the German Embassy, the party being received personally by the German Ambassador. They next visited Mortlake Garage, L.G.O.C., and the Chiswick Overhaul Works, where lunch was served. Later the party went to Clapham Common "Underground" station and travelled over the City & South London Extension to Morden. Tea was provided in the depôt there. In the evening a dinner was held in the Palace Rooms, Palace Hotel, Bloomsbury, on the invitation of the President and Officers of the Railway Students' Association, the chair being occupied by the President, Sir Ralph L. Wedgwood, C.B., C.M.G., Chief General Manager, L.N.E.R. The President was supported by the Lord Mayor of London, the Minister of Transport, and the Minister of Labour, together with numerous railway officers and others.

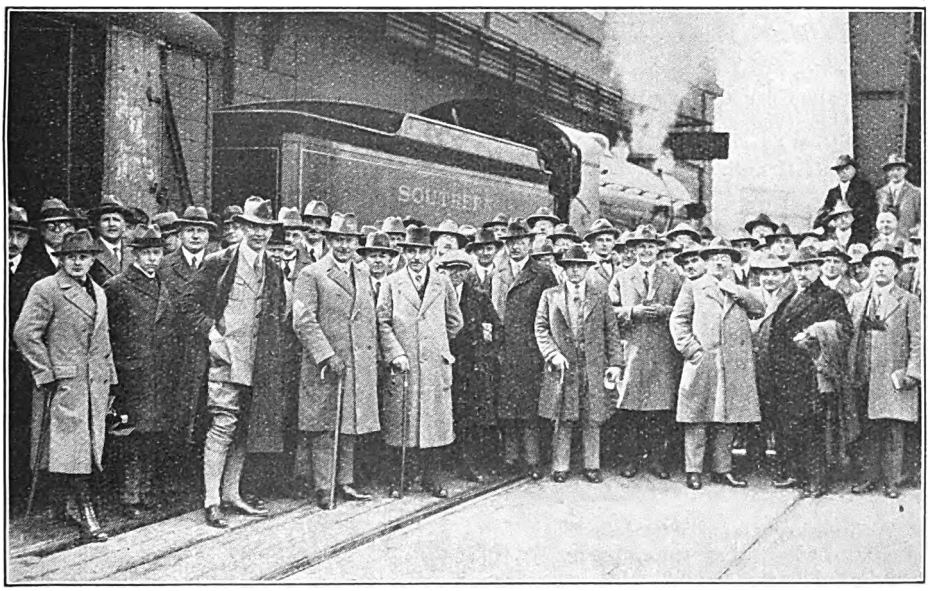

Photo.] ARRIVAL OF GERMAN RAILWAYMEN AT DOVER, APRIL 29. [*Topical.*

After the toasts of "The King" and "The President of the German Republic" had been duly honoured, Sir Ralph Wedgwood proposed the health of "Our German Visitors," his interesting speech being delivered very fluently in German.

Dir. Ing. Steuernagel replied in German, a summary of his speech being then given by Mr. Teddar, one of the L.N.E.R. Continental representatives. Sir Lynden Macassey proposed "His Majesty's Ministers," and Sir Arthur Steel-Maitland, Minister of Labour, responded. The Lord Mayor proposed "The Railway Industry," and, on behalf of the City of London, extended a welcome to the visiting students. Col.

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Wilfrid Ashley, Minister of Transport, replied.

On Tuesday the party proceeded to Swindon to inspect the Locomotive and Carriage Works of the Great Western Railway. They were the guests of the G.W.R. at a lunch, presided over by Mr. C. B. Collett, O.B.E., Chief Mechanical Engineer, supported by Messrs. W. A. Stanier, Principal Assistant, J. Auld, Docks and Personal Assistant, R. A. G. Hannington, Works Manager, F. C. Hall, Assistant Locomotive Running Superintendent, and T. B. Harris, representing the General Manager's office. Herr Bruck voiced the thanks of the party to their hosts. Proceeding to Bath, a short sight-seeing tour was arranged, and in the evening they were entertained to dinner at the invitation of the Mayor of Bath (Alderman Chivers).

Following the loyal toast and that to the President of the German Republic, the Mayor proposed "The Guests," associated with the name of Herr Steuernagel. The Mayoress (Madam Sarah Grand) also spoke. Reichsbahndirektor Steuernagel replied. Prof. Dr. Vloss then proposed "The British Railways." Sir Josiah Stamp (President of the Executive, L.M.S.R.) replied. In offering the toast of "The Mayor," Sir Felix J. C. Pole, General Manager, G.W.R., said he wished to associate himself with the remarks which Sir Josiah Stamp had made regarding certain aspects of railway operation in this country. The Mayor replied suitably. Mr. J. G. H. Warren then gave an interesting *résumé* of the history of the local plateways and early railways, illustrating his remarks by means of prints and photographs.

On Wednesday the party left Bath for Birmingham, where they were met by Mr. T. H. Shipley, District Goods Manager, Birmingham, L.M.S.R., who conducted them on a tour of the Curzon Street Goods Depôt, and afterwards presided over a lunch at the Queen's Hotel. Proceeding to Derby, a visit was paid to the L.M.S.R. Carriage and Wagon Works, and, after tea at the Midland Hotel, to the Control Office. The party left for Manchester at 7.10 p.m.

On Thursday the visitors inspected the L.M.S.R. Train Control Office at Victoria station, Manchester, and the Wath shunting yard of the L.N.E.R. Proceeding to York, a visit was paid to the L.N.E.R. Railway Museum there, and the journey continued to Edinburgh, where the night was spent.

Friday's arrangements included an inspection of the Forth Bridge, and a tour through the Trossachs, returning by night train to London. On Saturday a visit to Feltham marshalling yard, Southern Railway was abandoned to leave the day free for shopping, &c., before returning from Liverpool Street, via the Hook of Holland route, in the evening.

The "Greenock Bogies."

MR. MALCOLM M. NIVEN writes as follows: "Mr. Reilly, in his remarks regarding Mr. Manson's engines having 7-ft. coupled wheels, is not correct. Neither the late Mr. Hugh Smellie nor Mr. Manson ever built 4-4-0 engines with a wheel diameter of this size. It is 6 ft. 9 in., which was standard in Mr. Manson's time, and since Mr. Hugh Smellie's No. 18 (2-4-0) class in 1879, no larger diameter wheel ever was used on the old G. & S.W. passenger engines. Mr. James Stirling's coupled engines, which are still at Hurlford in a rebuilt form, had 7 ft. 1½ in. coupled-wheels. The engines on the Greenock road built by Dübs & Co. originally numbered 336 to 346, had 6 ft. 1 in. wheels, and Nos. 346 to 360 5 ft. 9 in. coupled wheels. Many of these are distributed about the system. Six-foot wheels were always used since the opening of the Greenock Line, in the seventies. Mr. Stirling's 2-4-0 engines, Nos. 59, 60, 170, 171, &c., ran this road in 1883, until Mr. Smellie put on his 'wee bogies' ("119" class). Many of these are still running and doing well. Nos. 14133, 14135, 14124, 14125 and 14126 run the miners' train service about the Annbank district, and others pilot trains of empty carriages about Glasgow. No. 14133 often runs from Hurlford sheds with trains into Glasgow. The original numbers of Mr. Smellie's 6-ft. engines were 119, 120, 123 to 140, 151, 152, 155, 156. Latterly, these had A appended, when the 4-6-0 engines took some of these numbers. Mr. Drummond's Caledonian bogies, Nos. 81, 82, 85, 86, 114, 115, 116, 195 and 196 had about the same dimensions, but the Gourock engines had 18-in. cylinders against 18½-in for the Smellie engines. If Mr. Reilly knows the works numbers of the engines their original numbers are easily identified. Old No. 79, a 6 ft. 9 in. Smellie now at Hurlford, is 14141. This old engine is not rebuilt and runs with her original domeless boiler. Mr. Smellie used the Stirling design of cab."

The Lynton and Barnstaple Railway.

MR. G. N. SOUTHERDEN sends some notes on the locomotives and traffic working of the Lynton and Barnstaple line, which now forms part of the Southern Railway. This line was opened on May 16, 1898, has a total mileage of 19½, and is built to the 1 ft. 11½ in. gauge. The locomotive stock consists of five tank engines. Of these four are of the 2-6-2 type, numbered and named as follows: 759E *Yeo*, 760E *Exe*, 761E *Taw*, and 188E *Lew*. These were constructed by Manning, Wardle & Co. Ltd.,

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the first three in 1897 and No. 188E during 1925. The remaining engine is a 2-4-2 tank, No. 762 *Lyn*, built by the Baldwin Locomotive Works, of Philadelphia, Pa., and illustrated on page 297 of the October, 1926, issue of THE RAILWAY MAGAZINE. The number of coaching vehicles on the line amounts to 17, and there are 24 goods vehicles. Most of the rolling-stock is now painted in the S.R. colours, the former L. & B. colours being brown and cream for passenger stock. The trains are made up of varying lengths to meet traffic requirements, and, by way of illustration, our correspondent mentions that on one occasion he noted a down train of two bogie coaches, hauled by 2-6-2 *Taw*, pass the up train at Cheltenham composed of seven bogie coaches, a four-wheeled box van, and a bogie box van, headed by 2-6-2T's *Lew* and *Yeo*.

Photo.] [*Topical.*

ENGLISH AND FRENCH RAILWAY FOOTBALL TEAMS AT EARLSFIELD, APRIL 18.

A number of L.S.W. type signals, some with wooden posts and arms, and others with lattice posts and corrugated arms, are in use, although many signals are still of the L. & B. type. One of the latter, now replaced, was shown on page 210 of the September, 1922, number of THE RAILWAY MAGAZINE. By reference to the illustration, it will be noted that the spectacles are arranged symmetrically above and below the arm. Signals are provided only for running lines, and there are no distant, siding or other signals. For more detailed particulars readers may be referred to a descriptive article by Mr. J. F. Gairns which appeared in THE RAILWAY MAGAZINE for May, 1917.

London Railways Athletic Association.

THE affairs of this Association have been wound up and replaced by a new organisation to be known as "The Railways Athletic Association." The inaugural meeting of the latter Association took place at Baker Street on April 8, at which Mr. W. G. Pape, O.B.E. (Indoor Assistant to the General Manager, Southern Railway), presided, and was supported by Messrs. A. J. Brickwell C.B.E. (L.N.E.R.), R. H. Pitts (Underground Railways), E. A. Richards (Southern Railway), W. W. Sharp (L.M.S.R.) and E. S. Hadley (G.W.R.). The primus President of the new Association is Sir Herbert A. Walker, K.C.B., and the Vice-Presidents of the London Railways A.A. were unanimously elected to the newly-formed organisation.

The first function of the Railways Athletic Association was a football match on Easter Monday against a team chosen from the Nord Railway of France. The game took place on the ground of the Summerstown F.C. at Earlsfield, and the result was a win for the English side by three goals to two. Additional interest was vested in the match by reason of the fact that the winners were to hold the Silver Cup presented to the Railways Athletic Association by Mr. W. G. Pape for annual competition between football teams of English and French railwaymen. At the end of full time the score was two goals all, and it was decided to play extra time with a view to ascertaining which side were to be the first holders of the trophy, and during this extra period W. Lansdowne, of the R.C.H., netted for the third time that afternoon. The game was a keenly contested one, and there was very little to differentiate between the sides.

In the evening a banquet was given at the Craven Hotel, Charing Cross, in honour of the French railwaymen. A gathering of over seventy sat down to the festive board, at which Mr. Pape presided. A message of

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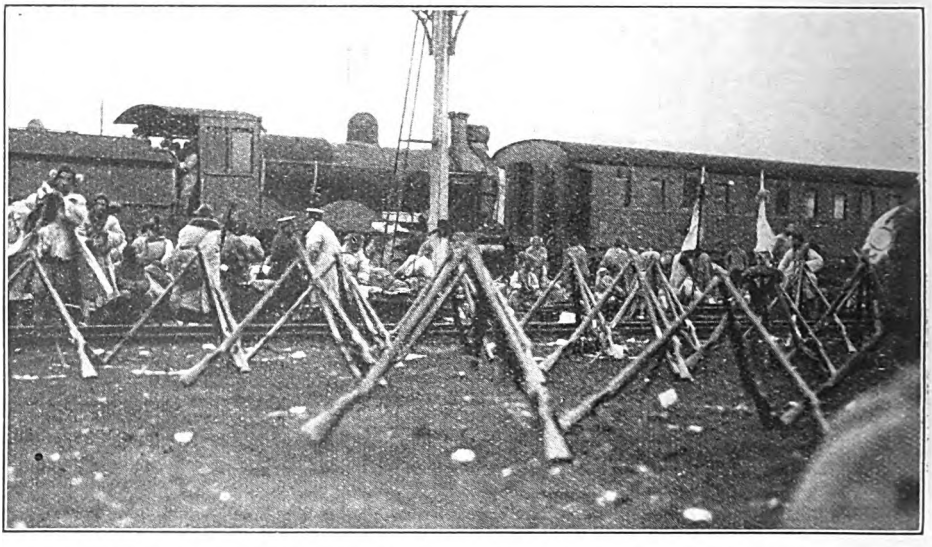
welcome was read from Sir Herbert A Walker, and M. Javary, General Manager of the Nord Railway, who unfortunately was unable to attend, sent greetings and expressing the hope that everything possible would be done to foster these international railway matches. Following the dinner a concert was held.

Tilbury-Dunkirk Continental Service.

FOR some time past mention has been made in the general press of a contemplated new Continental service between Tilbury and Dunkirk. The scheme has now taken definite shape and the new service was inaugurated on May 15. Modern steamers are run by the Angleterre-Lorraine-Alsace Company, and the London Midland & Scottish Railway provides restaurant-car express train facilities direct to Tilbury. Through carriages are run from Manchester, Bradford and Leeds, and passengers from Glasgow, Edinburgh, Manchester, Bradford, Leeds, Sheffield, Derby, Leicester and Nottingham are thus able to travel from those stations direct to Tilbury without changing. In the case of passengers travelling by trains to Euston, free conveyance is provided to join the boat train at St. Pancras. On the other side direct restaurant-car services are run from Dunkirk to Basle, with connections to Switzerland and Italy, while a connecting restaurant-car train is run between Dunkirk and Paris. The official statement issued in regard to the new services emphasises the convenience of the route to business men and tourists, especially those from the provinces, in that the journey is continuous, with no break in London, thus obviating hotel and other contingent expenses. Reasonable fares are charged, while expeditious facilities are provided for the conveyance of merchandise traffic. Modern equipment has been installed at Tilbury for rapid loading and unloading of goods and luggage, with through goods traffic facilities to and from Tilbury, while arrangements have been arranged to cover speedy clearance through the Customs.

The Railway Situation in China.

MR. C. V. GUNTON TURNER, writing from Tientsin, explaining that he has recently travelled over all the railways north of the Yangtse Kiang, sends some information as to the situation on various lines in China. As this contains many items of interest, we reproduce Mr. Gunton Turner's remarks nearly in full.



CANTONESE TROOPS BIVOUACED ON SHANGHAI-NANKING RAILWAY, MARCH 23, 1927.

"The Tientsin-Pukow line, on which the famous 'Blue Express' runs, has for a long time been subject to the vagaries of rigid military control, with the result that goods traffic has been nil and passenger traffic subject to many needless delays. For many months the 'Blue Express' has only run three times weekly—*vice* every day, Sundays included—chiefly because some of the cars have been taken on to other lines, used as staff headquarters and never returned, and partly owing to locomotive shortage and failures, and this train does

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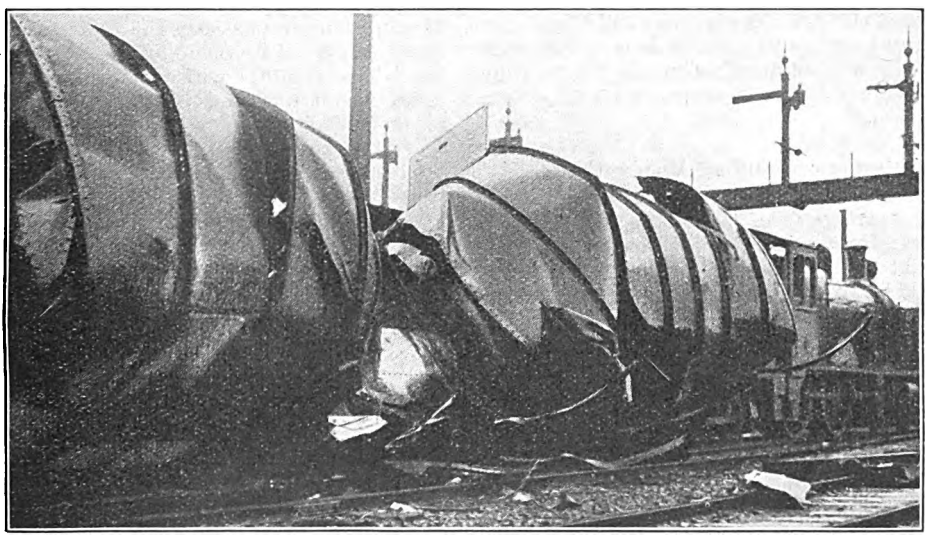
not now run beyond Tientsin, instead of terminating at Peking as was originally the case. It is interesting to note that the train, though ordered some five years ago, has never yet been paid for; in fact, the interest on the cars has been in default for the last eighteen months or so. All rolling-stock is rapidly becoming useless, owing to the military declining to release it for proper periodic overhaul, and locomotives from at least five other railways are to be found working on this line.

"The Lunghai and Pienlo line, on which the two trains mentioned in the enclosed article were, has for some months past been completely devoted to military control, and passenger and freight traffic has been at a standstill. The Tsingtao-Tsinanfu line is in much better shape, mainly owing to Japanese pressure, as they are large share and loan holders, and, in general, the train services are maintained well up to schedule."



EFFECT OF CANTONESE SHELL FIRE ON ALL-STEEL COVERED BOGIE WAGON, SHANGHAI NORTH MARSHALLING YARD, MARCH 22, 1927.

The Peking - Mukden and Chentow - Taiyuanfu Lines.

"THE Peking-Mukden line may also be said to be in fairly good order, and the principal expresses between Peking-Tientsin-Mukden run fairly well on time. Freight traffic, however, is scarce, and there are not half enough cars for the freight offered. It is interesting to note that the Kailan Mining Association recently purchased a number of R.O.D. Great Central consolidations, which are now being used on this line, and the railway is paying for them on the hire purchase system. The state of affairs on the Peking-Hankow line beggars description. Through traffic has been non-existent for many months; indeed, the writer travelled for seven days, in August last, in open freight cars, not altogether an enviable experience, with temperatures ranging from 110 deg. to 115 deg. in the shade. The rolling-stock and permanent way are almost entirely worn out, and accidents to such trains as do run are frequent.

"The Chentow-Taiyuanfu line (metre-gauge) is running to its ordinary schedule, they being fortunate in that their rolling-stock cannot be used on the standard-gauge lines; they have a larger foreign staff than any other line, and the province the line runs in has only been on the fringe of the eternal civil wars. The Peking-Suiyuan line has suffered as badly as, if not worse than, any of the other lines coming under the influence of the militarists. Passenger trains are almost non-existent, and the rolling-stock, especially as regards locomotives, is in a truly deplorable condition. There is a goods service of sorts, but in order to make certain of goods arriving safely at the other end, one has to pay three times the scheduled freight as authorised by the Board of Communications, the extra going in the form of 'squeeze' to the various civil and military officials. The South Manchurian line, of course, is directly administered by the Japanese and has suffered no interference whatsoever; it is, in fact, easily the best railway in the East.

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The Chinese Eastern line (from Changchun to Manchouli) is also fairly good, though trains are very slow and permanent way badly in need of repair.

"To anyone used to home conditions, the state of affairs out here is absolutely beyond the bounds of possibility. The staffs of the Peking–Hankow, Tientsin–Pukow, Peking–Suiyuan, and Lunghai–Pienlo, both native and foreign, are at least six months in arrears with their salaries, as the military commandeer everything without any intention of payment, and any small amount of revenue which comes in from the very occasional freight or passenger trains is absorbed by running expenses. The writer travelled on a passenger train on the Tientsin–Pukow line fairly recently, and had to give his contribution towards buying enough coal to take the train to a junction where the railway held stocks; this was occasioned by the military commandeering the stocks from the tender of the passenger train's locomotive!"

An Automatic Coupling Incident.

WITH his letter, Mr. Gunton Turner sends some cuttings from the *Peking and Tientsin Times*, from which the following story is extracted. To appreciate the incident, it should be noted that all Chinese railways have central automatic couplings, so that the coupling up of the trains, as narrated, was not so "fluky" as might appear on first suggestion. "For four days prior to the morning of March 23, General Kao Iu-tung, of the Chin Yun-ao forces, had been harassing the Fengtien front by running an armoured train up and down the railway line from a point within sight of Chengchow to a station called Shihlipu. Fengtien artillery was ineffective, and the armoured train of the Northern forces, as was known to the enemy, was in the repair yards. General Kao did not know it, but repairs to the armoured train of the Northern forces had been completed, and the Fengtien trains backed quietly out of Chengchow and into the morning mist, making down the same track that the Southern train had been using for four days. General Tsao was in command. It so happened that the Southern armoured train was also abroad early, backing up the track toward Chengchow. The two trains collided in the mist. Both were going slowly, and there was no damage. By one chance in a million, the couplings on the rear cars of the two trains held, and as soon as the ludicrous situation was realised, both engines began a vigorous tug of war—General Kao's engine trying to pull the Fengtien train southward, and into the Cantonese lines, while General Tsao's engine puffed and pulled trying to haul the Southern train back to Chengchow. The Fengtien engine was the stronger of the two, and the combined trains began to move toward the Northern headquarters. The Southern armoured train was hauled into Chengchow, and the wounded were given hospital treatment. The captured southern train consisted of the engine, two supply cars, an armoured car, and then tailed off into three more armoured cars. The Northern train consisted of the engine and five armoured cars."

Model Railway Club Exhibition.

As usual the Annual Exhibition of the Model Railway Club was an unqualified success. There was a large number of exhibits covering all phases of railway activity. The work generally was of a higher standard than in previous years, probably due to the increase in club membership, thus emphasising the greater interest being displayed in model railway engineering. The exhibits which ranged from the usual locomotive and rolling stock models down to such details as colour-light signalling and signal lever frames, included an interesting series of locomotives and rolling-stock shown by Mr. G. P. Keen, the Club's President, of free lance design, built by Mr. Beeson, junior, for the "O" gauge "K" lines which are being electrically operated. This exhibit also included an L.N.E.R. sleeping-car train and some French coaches, the sleeping cars being complete down to the minutest detail, together with a train of goods rolling-stock belonging to Mrs. Keen who operates the "Pantry" section of the "K" lines. Two interesting historical models were included, (1) A 2-2-0 locomotive named *Colossus* built to a scale of 1½ ins. to 1 ft., modelled on a locomotive built between 1834 and 1838 for the Dublin & Waterford Railway by Forrester of Liverpool. The model was built about the same time, and was exhibited by Mr. E. Spiller. The second historical exhibit was a working model of the *Rocket* built in 1835 and exhibited at Leeds in 1851, where it gained a prize. The model burns charcoal and was made by John Henderson of Huddersfield. The tender is unfortunately missing. An interesting Great Western exhibit was the work of Captain W. L. Sparks and Captain Layland-Barratt. The locomotives included in this exhibit were constructed to show that it is possible to produce good models of G.W.R. locomotives from the commercially made models. The G.W.R. passenger stock included two articulated trains, and also a large number of goods wagons, &c. Captain Layland-Barratt spared himself no pains to make the paint work as near to the prototype as possible. The paint used was actually the same as that employed on the passenger

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rolling-stock at Swindon, and the crests and lettering were entirely hand painted. It may here be remarked that more than 70 per cent. of the models at this year's exhibition were based upon G.W.R. and S.R. prototypes. Some beautifully made models of steel corridor stock to the 7 mm. scale were shown by Mr. J. L. Klienwort. These were notable for their lightness of construction. An excellent unfinished model of a G.W.R. 0-6-2 tank was the work of Mr. W. V. Hunt. Mr. Bindon Blood showed a G.W.R. suburban train of three 4-wheeled coaches rebuilt from old 1 in. commercially made models. A super detail G.W.R. "Castle" class 4-6-0 *Windsor Castle* was the work of Mr. E. Exley of Bradford. The engine was complete in all details, including water pick-up apparatus under the tender, sand pipes to the coupled wheels, and brake gear to the leading bogies. An excellent selection of Southern Railway, L. & S.W. section locomotives represented the work of Mr. H. T. Clarke. An "O" gauge light railway coach built to the ½ in. scale by Col. R. Henvey was notable for its most beautiful workmanship, and faithful reproduction in detail. The centre spring automatic couplers fitted incorporated some ingenious ideas of the builder. Mr. Hart showed a S.R. electric three-coach unit reconstructed on the articulated principle from coaches sold commercially. The Caledonian and L. & N.W. section of the L.M.S.R. were well represented by the model locomotives shown by Mr. A. B. MacLeod. Several examples of permanent-way construction were included in the exhibition. Notable among these may be mentioned Mr. R. F. Stedman's section of an "O" gauge track with a double junction constructed absolutely to scale in every respect. A 15-lever locking frame built to gauge 1 was also shown.

Mr. G. L. Brampton showed his 30-lever interlocking frame which was also complete with diagram. An "O" gauge section of a railway included a complete station with over-bridge level crossing gates, tunnel, tube station, section of line adjoining a covered way, roads, trees, and wireless aerials—these presumably for the use of the station master. Mr. H. G. Kerr's "OO" gauge electrically operated section of track complete with goods rolling-stock and electric locomotives attracted much attention. On half of it the current was conveyed by the third rail system, and for the remainder by overhead wire. Automatic coupling and uncoupling devices fitted to each unit allowed the whole system to be controlled from a central switchboard. In the annexe adjoining the hall were a number of model locomotives of various types constructed by Mr. Beeson, junior. These included coal-fired models, and several having single cylinders with gearing. The Club's electrically operated "O" gauge track and rolling-stock were in constant operation throughout the exhibition, and attracted much attention. On the other side of the hall the Club's track was in use for hauling passengers, the locomotives being kindly loaned by Mr. Crebbin. A number of model engineering firms exhibited on the trade stands. These included Bassett-Lowke; Bonds, who included on their stand some of the Leeds Model Company's goods; Kay Models; Percival Marshall & Co. Ltd., &c.

Among the many visitors to the Exhibition was Sir Felix J. C. Pole, General Manager of the G.W.R.

L.M.S. Locomotive Matters.

Nos. 13044-9, which are in traffic unpainted, complete the second series of 2-6-0's ex Crewe. A further ten engines of the same type will also be out shortly. Latest class "4" 0-6-0's to be delivered are Nos. 4348-51 ex Kerr, Stuart & Co., and Nos. 4362-6 ex A. Barclay & Sons. Three of those recently supplied by the North British Loco. Company, have been transferred to the Midland Division, viz., Nos. 4404-6. The number of the new Kerr, Stuart 0-6-0 which was noted last month should read "4347." The following 0-6-2 side tank coal engines have been fitted for motor service:—Nos. 1201, 7717, 7733, 7763 and 7825. Of these, the latter four were previously Nos. 1203, 1210, 2010 and 709 respectively. Class "G" 0-8-0 No. 9151 (old No. 641) is now superheated.

Under the new system of allocation, the four-cylinder "Claughton" class locomotives will be stationed as follows:—Nos. 5900-5954 at Crewe; Nos. 5955-5972 at Rugby; Nos. 5973-5991 at Camden; Nos. 5992-6009 at Edge Hill; Nos. 6010-6020 at Longsight; Nos. 6021 and 6022 at Preston; Nos. 6023-6025 at Carlisle; and Nos. 6026-6029 at Bangor. The "Princes" allocated to Crewe are Nos. 5600-5647 and 5845.

Special D.X. goods Nos. 3130 and 3552 and special tank shunters Nos. 3158, 3253 and 3265 have been withdrawn for scrapping.

The Vulcan Foundry, Ltd., are now delivering 50 4-4-0 compounds, of which fifteen, Nos. 1185-1199, are already in service on the Western "B" Division (L. & Y. Section). The next 25 engines, Nos. 901-924, have been allocated to the Northern Division, and the last ten, Nos. 925-934, to the Midland Division. It is understood that the three "Garratt" engines ex Beyer, Peacock & Co., have recently arrived at Derby. They are of the 2-6-0-0-6-2 type and numbered 4997-8-9.

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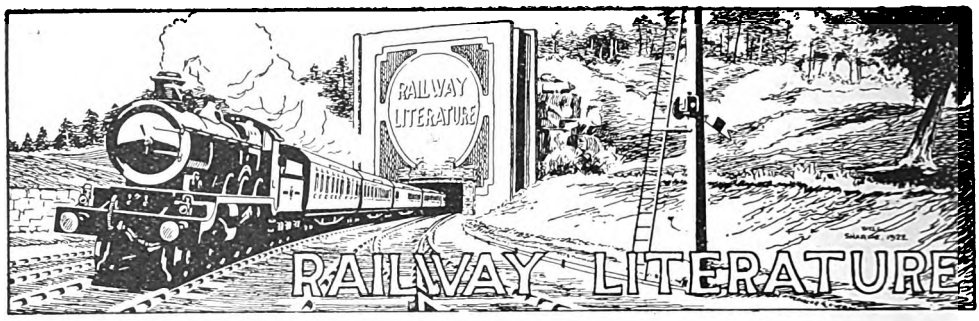

THE OLD COUNTRY. Published by the Canadian Pacific Railway. For the benefit of visitors to England, the Canadian Pacific Railway has prepared a handy guide to Great Britain entitled "The Old Country." The cover includes a view in colour of part of London Bridge, showing shipping on the Thames, the Tower Bridge being visible through an arch of the bridge. The booklet includes useful travel information and particulars of the various railway companies in Great Britain and Ireland, arranged in sections, so that, associated with each railway, are illustrated items directing attention to and giving information respecting the various places of interest to trans-Atlantic visitors. First, in the case of the L.M.S.R., "The Best Way" is described to the Shakespeare, Washington and Franklin countries, and to Oxford, Cambridge, the English Lake District, Chester and North Wales, Shrewsbury and Central Wales, the Lancashire Coast, Scotland and Ireland, together with many other parts. The Southern Railway is similarly treated, a section dealing with Canterbury, Chichester, Salisbury, Exeter and Winchester Cathedrals, Tunbridge Wells, Stonehenge, the Isle of Wight, Bournemouth, the Channel Islands, Windsor, Southampton, and the South and North Devon and North Cornwall coasts. Reference is also made to the Continental facilities, including those affording access to the Canadian battlefields of France and Belgium. The London & North Eastern section similarly deals with the numerous Cathedral Cities served by the system, East Coast resorts, places of inland interest, such as York, Ripon, Harrogate, Abbotsford, and Melrose Abbey. Edinburgh and many other places receive attention, while the numerous coast resorts are also dealt with. The Great Western section has a similar range of subject matter, including cathedrals, castles, the Shakespeare Country, Devonshire, the Cornish Riviera and the Scilly Isles, Somerset, Dorset, Wilts, and the Channel Islands, North Wales and the Cambrian Coast, South Wales, &c. Shorter sections are devoted to the Cheshire Lines, Isle of Man Railway, Great Southern Railways of Ireland, Great Northern Railway of Ireland, and the Belfast and County Down Railway. In the centre of the booklet is a useful plan showing the principal London thoroughfares and the positions of places of interest, while several pages are devoted to general information in regard to the Metropolis and places of interest in the vicinity. At the end is a list of the principal social, athletic and other events during the period May to October. At the back are particulars of Canadian Pacific Railway facilities, local offices, &c., With the aid of this guide, visitors to "The Old Country" should find it a simple matter to decide upon suitable itineraries for touring Great Britain and Ireland, and to find their way about.

A GREAT WESTERN ALLEGORY.—The Great Western Railway has reprinted as a folder the "allegory" by Hugh Mytton which appears in the April issue of its staff magazine. The "allegory" very neatly points the moral of the present unfair method of rate collecting in so far as railways are concerned—the figures quoted being taken from the rate-book of a country parish in which the G.W.R. have a stretch of railway but no station.

SOUTHERN RAILWAY HOLIDAY BOOKLET.—"My Finest Holiday" is the title of a new booklet on North Cornwall, just issued by the Southern Railway Company. It is from the pen of Mr. S. P. B. Mais and is an attempt to break away from the more conventional type of holiday literature. Mr. Mais has succeeded in producing an exceedingly interesting account of a sojourn in the delectable duchy—reached, of course by the famous "Atlantic Coast Express"—and as this is charmingly illustrated and artistically printed there is likely to be a heavy demand for it. The booklet, which is free, is obtainable at principal Southern Railway Inquiry Offices, or post free from the Indoor Commercial Manager, London Bridge Station, S.E.1.

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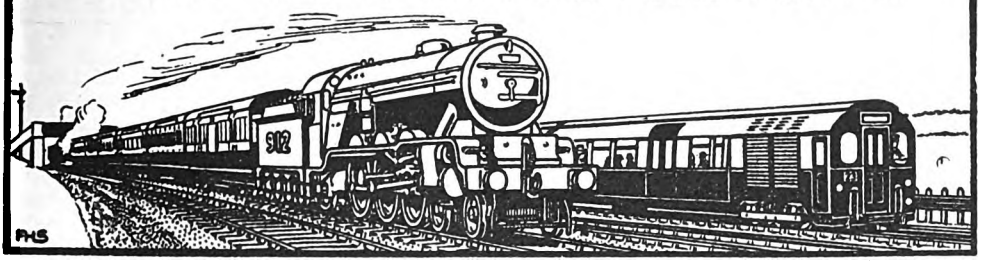
WHAT THE RAILWAYS ARE DOING.



THE London Midland and Scottish Railway Company have appointed Mr. J. Ballantyne, at present Goods Manager, Northern Division, to be Chief Goods Manager, in place of Mr. S. H. Hunt, who was appointed one of the Vice-Presidents of the company in connection with the new organisation introduced at the beginning of this year.

Mr. Ballantyne is succeeded by Mr. E. H. Davies, Road Transport Assistant to the Goods Operating Manager, Euston.

The company have also established a new department at Euston for the conduct of their Continental business, and in connection therewith have made the following further appointments :—

Mr. A. W. Barrett, Continental Traffic Manager.

Mr. K. R. N. Speir, Passenger Assistant.

Mr. H. W. Phillips, Goods Assistant.

Mr. Barrett has been Commercial Assistant to the Goods Commercial Manager.

Mr. Speir has been the company's Continental representative (Passenger) in Paris, and Mr. Phillips, District Goods Manager at Chester.

The new appointments took effect from May 1.

* * *

WE are officially informed that the directors of the London and North Eastern Railway have made the following appointments :—

Mr. B. P. Fletcher, Chief Assistant to the District Engineer at Newcastle, to be District Engineer at Cambridge.

Mr. W. P. Allen, Chief Staff Clerk, Superintendent's office, Yorks, to be Dock Superintendent at Middlesbrough.

Elliott] [*& Fry.*

MR. J. BALLANTYNE, O.B.E.,
Appointed Chief Goods Manager, L.M.S.R.

MR. JOHN BALLANTYNE, O.B.E., who has been appointed Chief Goods Manager, L.M.S.R., became Goods Manager (Northern Division), L.M.S.R., early in 1925. Prior to that he had held the office of General Superintendent (Northern Division) as from January 1, 1923. Mr. Ballantyne entered the service of the Caledonian Railway as a clerk at Beattock station, was subsequently employed at various stations on the line, in the capacities of booking clerk and goods clerk; and in 1897 was appointed to the position of Relieving Agent attached to the General Goods Manager's Office. He organised the Caledonian Railway Accounts Office, Glasgow, in 1910; was appointed Chief of the Accounts Office, Glasgow, in 1911, and later held the positions of Chief Clerk to the Outdoor Goods Manager and Assistant to the Chief Goods Manager, becoming himself Chief Goods Manager in 1918.

* * *

MR. A. W. BARRETT, who has been appointed Continental Traffic Manager, London Midland and Scottish Railway, entered the service of the former L.N.W.R. at Broad Street in 1898, and in the following year was transferred to the Assistant Goods Manager's Department at Euston. In January, 1914, he was transferred to the General Manager's Department. From 1916 to 1919 he served with H.M. Forces in France under the Director-General of Transportation. From September, 1919, to June, 1920, he was associated with Sir George Beharrell at the Ministry of Transport. In July, 1920, he resumed with the late L.N.W.R., and was

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MR. S. J. SYMES,
Appointed Works Superintendent, Midland Division, Chief Mechanical Engineer's Department, L.M.S.R.

MR. A. W. BARRETT,
Appointed Continental Traffic Manager, L.M.S.R.

MR. K. R. N. SPEIR,
Appointed Passenger Assistant to Continental Traffic Manager, L.M.S.R.

Photo. [*Lafayette.*

MR. H. W. PHILLIPS,
Appointed Goods Assistant to Continental Traffic Manager, L.M.S.R.

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engaged on Parliamentary matters until, in 1921, he was appointed head of the Rates Section of the Chief Goods Manager's office. In 1923 he was appointed Chief Rates Assistant to the Chief Goods Manager, and held this position until 1925, when he was appointed Commercial Assistant to the Goods Commercial Manager. This latter post brought him into close touch with matters relating to Continental business.

* * *

MR. K. R. N. SPEIR, who has been appointed Passenger Assistant to the Continental Traffic Manager in charge of the newly-established Continental Department of the L.M.S.R., has held the position of General Passenger Agent to the company in Paris since 1924. The second son of the late Mr. R. T. N. and the Hon. Mrs. Speir, of Culdees, Perthshire, Mr. K. R. N. Speir was educated at Radley and Pembroke College, Cambridge. He served an apprenticeship in the locomotive and electrical shops of the Midland Railway, under the late Mr. S. W. Johnson, and in 1902 was appointed to take charge of the experimental and investigation office associated with Derby Locomotive Works. In 1904 he became an Assistant to the Electrical Engineer. In 1905 he was appointed Secretary-General to the Egyptian State Railways, but in 1908 returned to England to take up an appointment as Assistant to Sir (then Mr.) C. W. Paget, General Superintendent. In 1914, Mr. Speir became Superintendent of Operation. In 1919 he was appointed Superintendent of Operation in charge of the London, Tilbury and Southend section. In 1924 he went to Paris, as above mentioned. Mr. Speir has visited America on several occasions in connection with electric traction and railway operating matters. He saw active service in South Africa in 1900–1 as A.D.C. to the late General Sir Charles Parsons. In 1914 he joined the Royal Naval Reserve, but in 1915 was seconded to the Royal Engineers, being placed in command of a group of R.E. Companies, Railway Operating Division. He was twice mentioned in despatches, received the D.S.O., was made a Chevalier of the French Legion of Honour, and is a Lieut.-Colonel in the Regular Army Reserve of Officers.

* * *

MR. H. W. PHILLIPS, who has been appointed Goods Assistant to the Continental Traffic Manager in charge of the new L.M.S.R. Continental Department, has held the position of District Goods Manager at Chester since 1925. Mr. Phillips entered the Lancashire & Yorkshire Railway service in February, 1897, as a junior clerk in the General Manager's office. He was transferred to the Chief Goods Manager's office in June, 1902. On October 21, 1902, he was made an Outdoor Assistant to Mr. J. Wharton, the then Goods Manager, and went to be Agent at Trafford Park on January 15, 1904. After occupying this position for 12 months (consequent upon the company having bought the fleet of steamers belonging to the Goole Steam Shipping Company and the Co-operative Wholesale Society, running between Goole and the Continental ports), he was appointed to act as the company's representative in Hamburg. He stayed in this position about four years, having, at the same time, the opportunity of visiting and doing business in most of the principal towns of Western Europe. On January 1, 1918, he was appointed Assistant Steamship Manager for the East Coast Services, and filled this position until March, 1913, when he was called to Manchester as Assistant District Goods Manager. In February, 1919, as a result of Mr. Senior's time being so fully occupied in London, Mr. Phillips was appointed Acting District Goods Manager, and 12 months later, on Mr. Senior being permanently attached to the staff of the General Manager, Mr. Phillips took over the position of District Goods Manager in Manchester.

* * *

MR. S. J. SYMES, O.B.E., who has been appointed Works Superintendent, Midland Division, C.M.E. Department, L.M.S.R., obtained his locomotive training at Inchicore Works, now headquarters of the Great Southern Railways (Ireland), leaving there to take up a position as draughtsman in the Atlas Works of the North British Locomotive Company, Glasgow. He joined the service of the old Midland Railway in 1904, and was promoted to be Chief Draughtsman in succession to Mr. J. E. Anderson in 1913, later succeeding that gentleman as Works Manager. Mr. Symes is a member of the Institution of Mechanical Engineers and a member of the Council of the Institution of Locomotive Engineers.

* * *

WE regret to record the death of Mr. Thomas Downes, formerly Assistant to the General Manager, Glasgow and South Western Railway. Born at Troon, Mr. Downes entered the service of the Glasgow and South Western Railway at Kilwinning station as an assistant to the parcel deliverer, and six months later was appointed a ticket collector. In 1881 he was transferred to the Superintendent's Department, and after serving in the various departments in that

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by the L.M.S.R. carried posters " L.M.S. to Aberdeen," " L.M.S. to Birmingham," and so on, in alphabetical sequence.

* * *

A NEW series of cheap day tickets for people taking rambles and outings in the country have been instituted by the Southern Railway. They are known as " Go-as-you-please " tickets. Hitherto, people taking a day in the country on a cheap ticket—single fare for the double journey—have had to return from the station to which they had booked. Under the new system, holders of these tickets may return from any of the stations (set out in a special programme) upon payment of the difference, if any, between the fare paid and the return reduced fare to the station from which they return, provided cheap tickets are issued to the latter station on the same day. These tickets are issued from any Southern Railway station in London to 125 stations on week-days and Sundays, and to 93 additional stations on Sundays only. The long-distance cheap fares are issued on Sundays only.

* * *

THE Transport Observation and Models Society held their first annual dinner on Thursday, April 21. A visit to the Romney, Hythe & Dymchurch Light Railway will take place in the month of June, and those interested in this and in transport and model work generally should communicate with the Hon. Secretary, Mr. S. M. W. Hann, Frensham, Shirley Road, Croydon, Surrey, who will be pleased to send full particulars concerning the Society.

* * *

WITH further reference to the frontispiece given with the March number, Mr. M. W. Earley, the photographer, explains that his description is correct. The train was travelling on the down relief line, due to the presence of a Newbury Race Special on the main line. This explains why the view gave the impression that an up train was shown, instead of a down, as described.

* * *

THE Central Garden Plots Committee of the Southern Railway announces that it is proposed to hold a Potato Competition in London on Wednesday, October 5. All entries must be submitted before September 19, and particulars of the competition can be obtained from Mr. Frank Gilbert, Hon. Secretary to the Committee, General Manager's Office, Southern Railway, Waterloo Station. The arrangements cover not only individual exhibits, but also a District Team Competition, in connection with which a special challenge shield, offered by the directors of the Southern Railway, is to be competed for annually.

* * *

WE much regret to record the death of Mr. Harold L. Hopwood, so many of whose articles have been published in the pages of THE RAILWAY MAGAZINE during the last 20 years or so. He was known personally to many readers, particularly in view of his close association for many years with the the Railway Club, of which he was one of the original members. Born in 1881, he entered the Great Northern Railway service in the Secretary's Office in January, 1897. In 1902 he became a clerk in the Locomotive

THE LATE MR. H. L. HOPWOOD.

Department, afterwards obtaining experience at Eastwood, West Hallam and Muswell Hill stations. In July, 1907, he returned to King's Cross in the Train Running Section of the Superintendent of the Line's Department, and remained there until going to Liverpool Street for a time under the L.N.E.R. In June, 1926, he went to the Train Section of the District Superintendent's Office at King's Cross. He had a large fund of historical knowledge, and was a painstaking writer of articles dealing with the histories of various lines and sections, besides being competent to refer to present-day traffic methods and conditions. As a rule, he took his own photographs, many of which have been reproduced in our pages.

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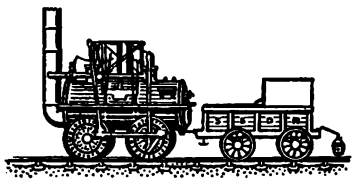
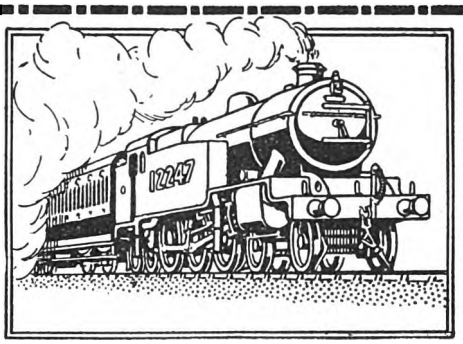
LOCOMOTIVE MATTERS





Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

Midland section Class "4" 0-6-0's Nos. 4274, 4275, 4277, and 4278, recently worked into Bournemouth West over the S. & D.J.R. line with excursions from Bristol.—["SIR CADOR OF CORNWALL."]

There are now 15 standard 4-4-0 compounds stationed at Newton Heath, and working L. & Y. trains, Nos. 1185-99. Other engines noted on these duties include:—New type 2-6-0's Nos. 13001, 13002, 13003, 13008 and 13010; Midland type standard 0-6-0's Nos. 4222, 4223, 4224, 4226 and 4230; L.N.W. 4-4-0 "Precursor," No. 2580 *Problem*, and L.N.W. "Princes," Nos. 233 *Suvla Bay*, 614 and 435 (fitted with Belpaire firebox). L.N.W. "19-in." 4-6-0 No. 8848, repainted in the new style and fitted with a Belpaire firebox, has been noted working the Preston and Wyre ballast train near Blackpool (Central, L. & Y.). L. & Y. 4-4-2 No. 10326 has been seen with the new number painted on the cab-sides in small yellow figures. The engine has retained the old L. & Y. livery, and the name of the section, "Lancashire & Yorkshire," on the tender. The locomotive power for the Garstang & Knott End Railway, since the scrapping of "New Century" and "Jubilee Queen," has been supplied by two L.N.W. 0-6-2T's, two L.Y.R. 0-6-2T's, G. & K.E. 2-6-0T *Blackpool*, and a L.N.W. motor-train set.—[G. R. A. TYSON.]

During Easter week-end the new 2-6-0's Nos. 13005, 13008 and 13010 were working excursion trains into Llandudno.—[R. L. DOWES.]

L.N.E.R.

G.C. 4-6-0's of the "Valour" class, Nos. 6164 *Earl Beatty* and 6166 *Earl Haig* are now regularly at work on Manchester-Marylebone expresses. "Sir Sam Fay" class 4-6-0 No. 5426 *City of Chester* has been taking turns on the 2.15 p.m. up and 8.45 a.m. down Manchester expresses with "Director" class 4-4-0's.—[B. K. COOPER.]

G.C. 0-6-0 No. 5572 has been working empty trains into King's Cross. 0-6-2T No. 4577 and 0-6-0ST No. 4047 have been fitted with Ross patent "pop" safety valves.—[J. G. BROWN.]

Information is desired as to old 0-6-0's Nos. 07037-07040, 07543, 07548 and 7119-7124.—["8280."]

"1712" class 4-6-2 tank engines, built by Hawthorn, Leslie & Co. Ltd., include the following numbers: 1712, 1719, 1738, 1753, 1756, 1760, 1766, 1767, 1768, 1771, 1782, 1784 and 1790.—[R. F. LANCHESTER.]

G.W.R.

A number of G.W.R. locomotives, including "Bulldog" 4-4-0's Nos. 3329 *Mars*, 3340 *Camel*, 3382 *Cardiff*, 3391 *Dominion of Canada*, 3431 and 3435; and "Flower" class 4-4-0's Nos. 4106 *Grosvenor*, 4109 *Monarch*, and 4152 *Calendula*; and 4-4-0's Nos. 3351 and 3342 have worked into Bournemouth with excursion trains from Bristol recently. 4-6-0 No. 4072 *Tresco Abbey* worked a relief Birkenhead express to Bournemouth, returning to the G.W.R. system the same evening.—["SIR CADOR OF CORNWALL."]

A number of the newer "45XX" class 2-6-2T's, including Nos. 4592-4595, have been stationed in London for working empty trains to and from Old Oak Common.—[F. J. T. AND G. G. TEMPLAR.]

S.R.

2-6-4T's Nos. 800A-804A are being transferred from Redhill to Dover and their places taken by Nos. 790A-794A from Brighton shed.—[B. W. HOWE.]

"D" class 4-4-0 No. 492A has been rebuilt

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as "D1" class. "D1" class 4-4-0 No. 487A is fitted with top feed. All ten of the Kirtley 0-6-0T's, Nos. 600-609, have been noted since the beginning of April on pilot and shunting duties at Victoria and Longhedge.—(SIR BORS DE GANIS.]

In the April issue a reference was made to 0-6-0T No. 136B standing in a siding at Southwick. Actually, this engine is standing on a short length of track, to which it was transferred by means of hydraulic jacks, and is used to supply steam to the stationary winding engine which works the incline at Kingston Wharf.—[E. F. BURT.]

The following Eastern section engines have been noted at Newhaven recently; Nos. 235A, 363A, 366A, 403A, 413A, 415A and 423A. "B4X" class 4-4-0's Nos. 67B and 73B work the boat trains on alternate days (except the week-day 4.42 a.m. up.).—[W. L. KENNING.]

The following L.B.S.C. section "Terrier" 0-6-0T's are at Fratton shed; Nos. 655, 659, 661, 662, and also No. 735E belonging to the L.S.W. section. New 4-6-0 type goods locomotives Nos. 823E, 824E and 825E are now out of the shops. 4-2-2-0's Nos. 369, 370 and 371 are withdrawn. "Drummond" 0-4-4T's Nos. 49, 55, 129, 243, 251, 252 and 481 are fitted for auto-train working on the Tulse Hill route, and Nos. 38, 245 and 667 for the Guildford and Farnham route.—[745 TINTAGEL.]

Information is desired as to the classes of S.R. locomotives Nos. 52A, 55A, 65A, 131A, 281A and 752A.—["273A."]

Great Southern (Ireland).

One of Mr. Wild's D.S.E. 2-6-0 freight locomotives has been withdrawn from service for overhaul. G.S. & W. 0-6-0 No. 211 has been sent to the D. & S.E. section in lieu. No. 211 is a larger type of 0-6-0 locomotive, as usually seen on the D.S.E. line. In connection with the International Rugby match at Dublin on March 12, a special cross-channel excursion was run. The train from Rosslare Harbour to Dublin consisted of two G.S. & W. 4-4-0 locomotives, and G.S. & W. stock, and travelled via the D. & S.E. route; the train crew however was D. & S.E. Regarding Mr. Wild's well-known 2-6-0 locomotives Nos. 15 and 16, it may be of interest to state that when these locomotives came over from Beyer, Peacock's in 1922, they were sent to Adelaide Sheds, Belfast, G.N.R., for safe custody, as owing to the troubled times then prevailing in Ireland, it was not considered advisable to send them down South. They have been in continuous use, however, since 1923 on freight, excursion, suburban semi-fast trains, and even on the "crack" train, the "Wexford Mail," on several occasions.—[J. J. KENNEDY.]

Large boilered 4-4-0 No. 333, which was stationed at Waterford from December to February was observed at Inchicore on February 24. Four-cylinder 4-6-0 No. 409 was seen running light on the down line near Kildare on the same date. G.S. & W. 4-4-0 No. 301 was at Westland Row station on February 25. Woolwich-built 2-6-0 No. 374 is undergoing heavy repairs at Waterford at present. She has been replaced on the Cork-Rosslare boat express by large 4-4-0 No. 336, which was withdrawn from Waterford for the purpose. D. & S.E. section 2-4-0 No. 422 is also being repaired at Waterford. D. & S.E. section 2-6-0 No. 15 was noticed working a goods train from Waterford to Wexford recently. G.S. & W. 4-4-0 No. 58 is now working on the Waterford-Macmine branch.—["URBS INTACTA."]

4-4-0 No. 334 has been attached to Bray shed for a while. 0-6-0 Nos. 101 and 117 were engaged on Westland Row-Bray trains on Easter Monday. 4-4-0 No. 60 and M.G.W. 0-6-0 No. 74 are still at Bray; they are the only survivors of the first batch of G.S.W. and M.G.W. locos. sent to Bray in January, 1925. 0-4-4T No. 80 has been attached to Grand Canal shed since the middle of March, also 4-4-2T's Nos. 270 and 274 are still there. 0-6-0 No. 211 works the Wexford goods, and No. 198 also works on goods. 0-6-2T No. 205 is engaged backing out goods from the G.S. station at North Wall.—[C. J. COGHLAN.]

Communications have also been received from the following correspondents:—J. Battye, "Bellvardy," "Caerphilly Castle," W. Carter, "Coppernob," J. D. Coxwell, D. P. Fisher, J. D. Hampton, A. Hills, E. Maxwell, G. T. Moody, C. H. Moon, "Moonstone," W. K. Nash, "Niagara," E. L. P. Quested, G. B. Routledge, A. C. Todd, F. G. Walker, R. Webster, R. A. H. Weight, S. Wenyon, George Whitehead, G. C. Wilson, C. J. Woodnutt, G. Woodward and "273A."

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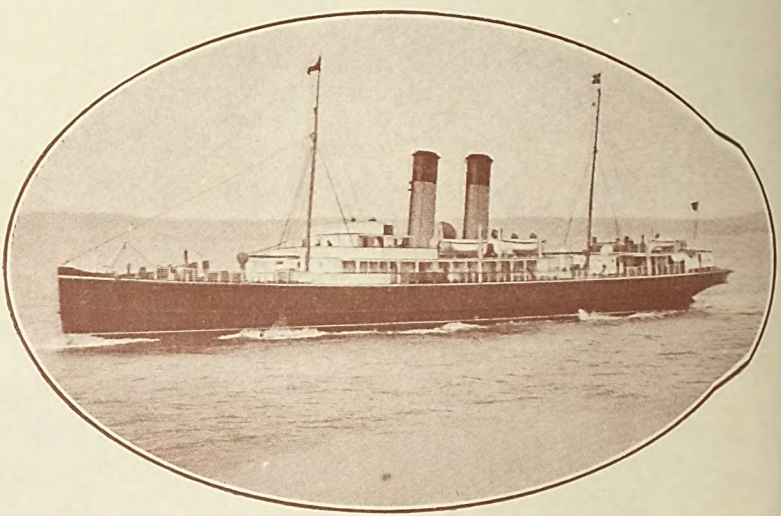

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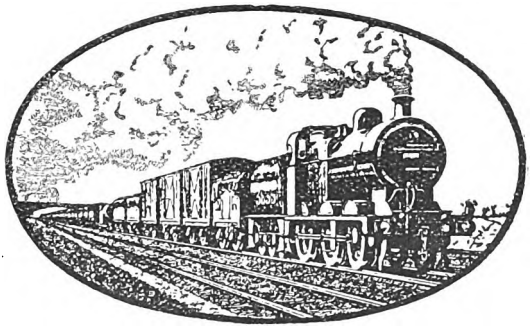

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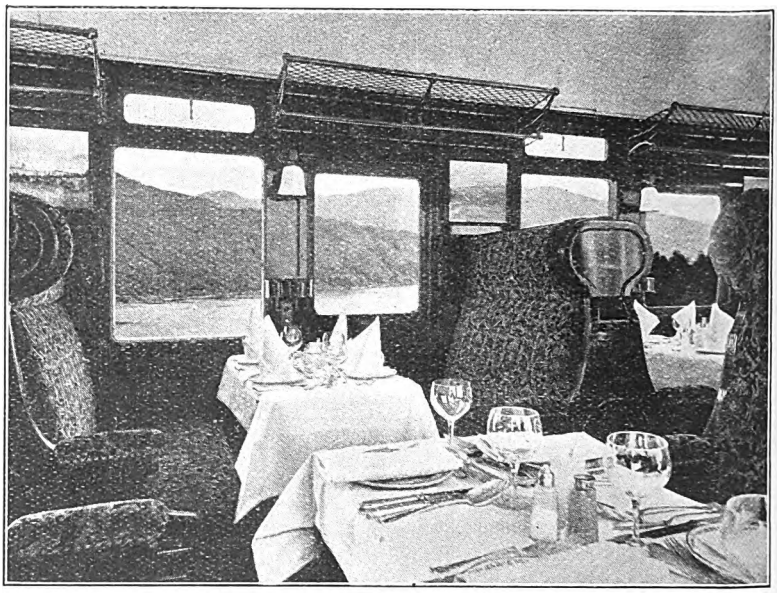

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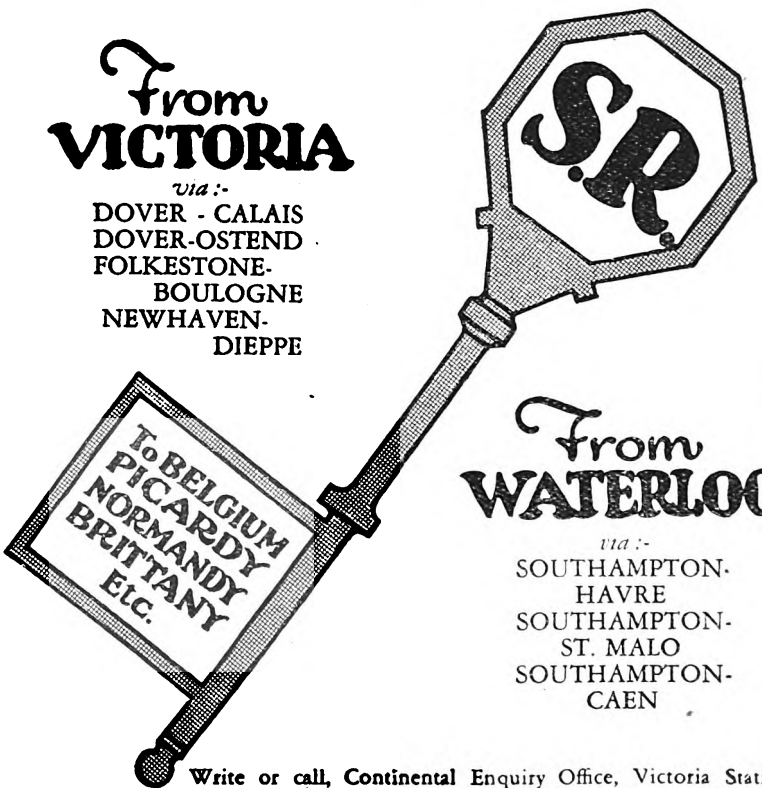

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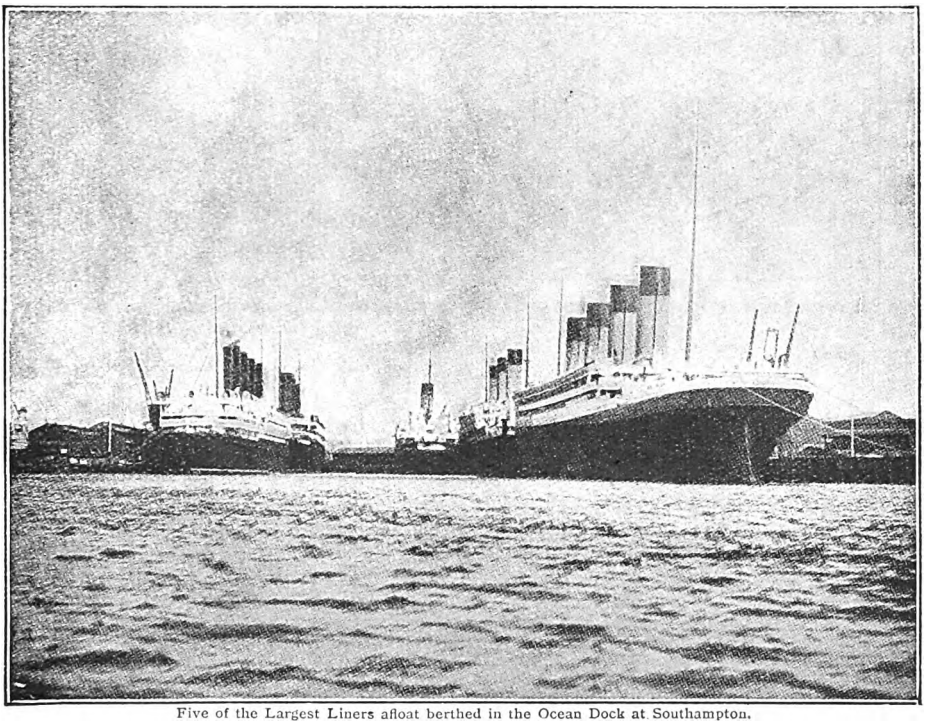

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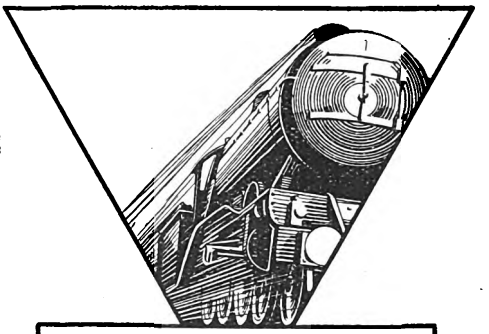

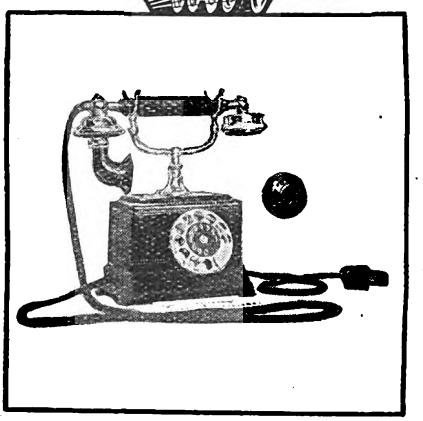

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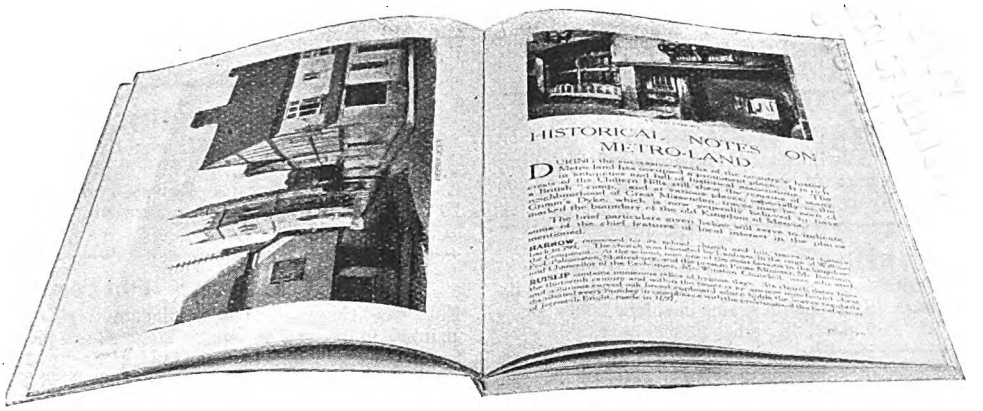

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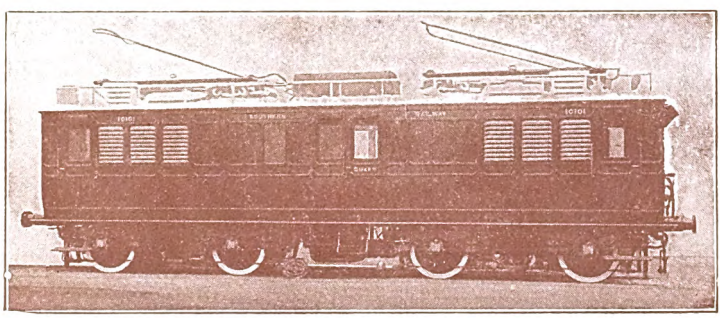

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